BÜHLER TECHNOLOGIES

Gas Analysis

Sample gas pumps

P1.3

Installation and Operation Instructions

Original instructions

BE420023
03/2020

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
E-Mail: analyse@buehler-technologies.com
Internet: www.buehler-technologies.com

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com
E-Mail: analyse@buehler-technologies.com

Read this instruction carefully prior to installation and/or use. Pay attention particularly to all advises and safety instructions to prevent injuries. Bühler Technologies can not be held responsible for misusing the product or unreliable function due to unauthorised modifications.

Document information
Document No.....BE420023
Version..... 03/2020

Contents

1 Introduction

1.1 Intended use

Model P1.3 sample gas pumps are intended for installation in gas analysis systems for industrial applications.

The complete designations of the sample gas pump P1.3 are:

P1.3 Atex	FM16ATEX0018X	II 3G Ex nA nC IIC T4...T3 Gc
	---	II 3/3G c IIC T3/T4 X (Examined by Bühler Technologies GmbH)
P1.3 IECEx	IECEx FMG 16.0012X	Ex nA nC IIC T4...T3 Gc
P1.3 US/Canada	Cl. I, Div. 2, Gps. A, B, C, D, T4...T3	

The maximum surface temperature varies by the medium and ambient temperatures. Please refer to chapter "Technical data [> page 29]" for the correlation between medium temperature, ambient temperature and the pump's temperature class. Flammable mediums must not be heated beyond these values. Please note, flammable gas must only be heated up to 80 % of its ignition temperature. The lower of the two values is the maximum medium temperature.

Gas sampling is generally **prohibited** if the gas flow results in a dangerous electrostatic charge in the bellow/pump body (also see chapter "Operation and control [> page 16]").

A minimum of 20 cm of tubing or piping must be installed between the sample gas pump and other system elements installed in the gas outlet according to the flow chart (e.g. cooler, analyser, filter, flow regulator, etc.) to ensure compliance with the temperature classes.

The P1.3 sample gas pump is not suitable for liquids. It may be operated at an ambient temperature range from 0 °C to 50 °C. Outdoor installation and operation prohibited.

Please note the specifications in the data sheet on the specific intended use, existing material combinations, as well as pressure and temperature limits.

1.2 Applied standards

FM US: FM 3600:2011, FM 3611:2004, FM 3810:2005

FM Canada: CSA C22.2 No. 213:2012, CSA C22.2 No. 1010.1:2004

Atex: EN 60079-0:2012 + Supplement A11:2013, EN 60079-15:2010

IECEx: IEC 60079-0:2011, IEC 60079-15:2010

The following standards have been examined by Bühler Technologies GmbH in line with the “internal control of protection”:

EN 13463-1:2009, EN 13463-5:2011

1.3 Special conditions

1.3.1 General

To maintain a T4 to T3 temperature class care shall be taken to ensure the ambient temperature does not exceed 50 °C.

Temperature classes are defined by the following table:

Type of gas	Maximum medium temperature	Temperature class	
		at installation site	in gas path
non-flammable	50 °C	T4	---
	70 °C	T3	---
flammable	50 °C	T4	T3

1.3.2 Especially FM US/CANADA

The apparatus is to be installed in a tool-secured enclosure in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.

1.3.3 Especially IECEx/ATEX

The installer shall provide transient over-voltage protection of the supply connections at a voltage not to exceed 140% of the voltage rating of the pump.

The pump shall be mounted in an enclosure providing a minimum degree of protection of IP54 in accordance with IEC/EN 60079-15, and shall be installed within a tool-secured enclosure which meets the requirements of IEC/EN 60079-0 and IEC/EN 60079-15.

1.4 Item number structure

The device is delivered with different configurations. The part number given on the type plate informs you about the specific configuration of your device.

On the type plate you will find the order number as well as the 13-digit product key. This number is a code where each digit (x) describes a certain feature:

42	xx	x	x	x	1	x	x	x	00	Product feature
										Basic model
	30									P1.3 ATEX, IECEx, US/Canada
										Motor voltage
		1								230 V 50 Hz 0,48 A
		2								115 V 60 Hz 0,84 A
		3								12 V DC 1,55 A (on request)
		4								24 V DC 0,8 A
										Pump head position
			1							Normal position vertical
			2							Turned by 180°
										Pump head material
				1						PTFE
				2						VA (1.4571)
				3						PVDF with bypass valve
				4						PVDF
										Valve material
					1					Up to 70 °C; PTFE/PVDF
										Screw in connections (depending on pump head)
						0				without
						1				PVDF DN 4/6 *
						2				PVDF 1/4“-1/6“ *
						3				PVDF 1/4“-1/8“ *
						5				VA (1.4401) 6 mm **
						6				VA (1.4401) 1/4“ **
										Mounting accessories
							0			without
							1			Mounting bracket and set of vibration dampers
							2			Set of vibration dampers only
										Housing
								0		without
								1		Housing incl. 3 m connection cable

* PTFE or PVDF pump body only.

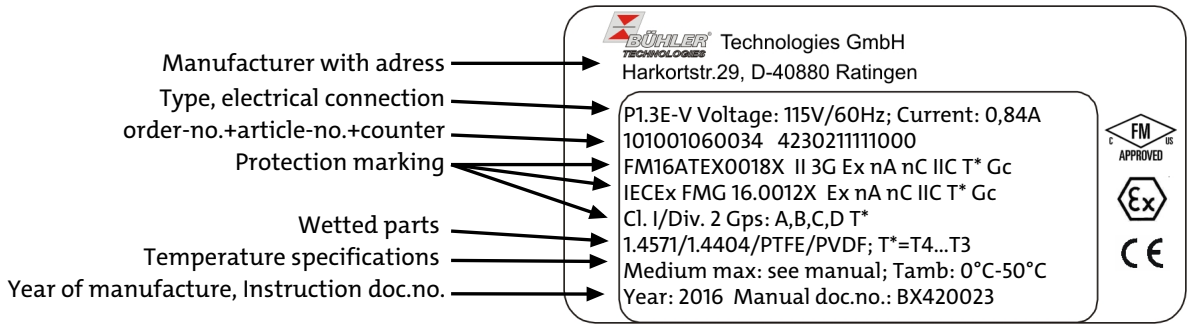
** VA pump body only.

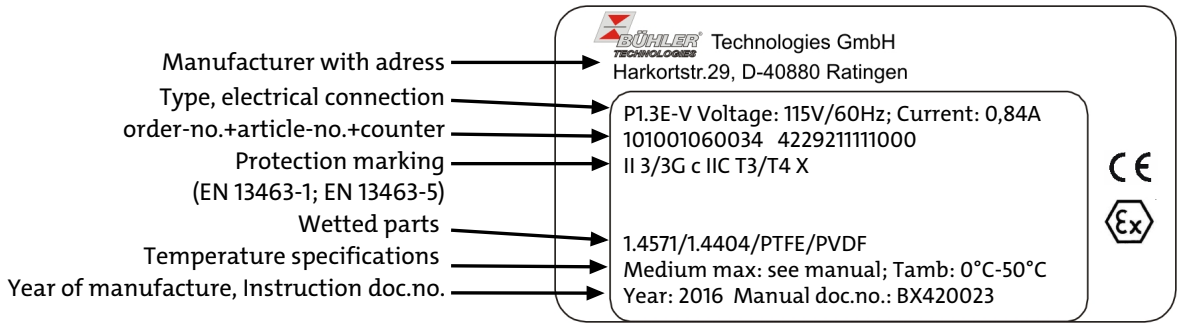
If there are special instructions for a pump type, they are marked in the manual.

Take care of the limits of the pump. When ordering spare parts chose for the type matching part numbers (e.g. valves).

1.5 Type plates

Examples:





1.6 Scope of delivery

- 1 x Sample gas pump with motor
- Product documentation
- Connection- and mounting accessories (only optional)

For logistics reasons, connection- or mounting accessories such as screw-in connections and/or mounting bracket are not factory installed!

1.7 Product description

The sample gas pumps are intended exclusively for the pumping of gaseous media. They are not suitable for liquids.

Please observe the information at the end of these instructions in relation to specific intended use, available material combinations, and pressure and temperature limits. In addition, please observe the information and labelling on the identification plates.

The maximum surface temperature depends on the ambient temperature and the temperature of the medium. The connection between the temperature of the medium, the ambient temperature and the temperature class of the pump is specified in the technical data.

NOTICE	**Limitations**
	The P1.3 pumps can pump non-flammable gaseous media and flammable gaseous media that are probably not explosive in normal operation (sampling from zone 2). Sampling gas from zone 2 is generally forbidden if the gas flow leads to a dangerous electro-static charge in the bellow / pump body (also see the “Operation” section). The ATEX respectively IECEx versions are provided for use in equipment group II, equipment category 3G, explosive category IIC, temperature class T4...T3, pumps must not be operated in dusty area. The US/Canada version is provided for use in Class I, Division 2, Groups A, B, C, D.

For applications in which the sample gas is still damp, condensate can form in the pipelines and in the pump body. In such cases, the pump body must be mounted in a hanging position (see point “Conversion to pump body pointing down”).

NOTICE

Never use sample gas pumps outdoors!

2 Safety instructions

2.1 Important advice

This unit may only be used if:

- the product is being used under the conditions described in the operating- and system instructions, used according to the nameplate and for applications for which it is intended. Any unauthorized modifications of the device will void the warranty provided by Bühler Technologies GmbH,
- complying with the specifications and markings in the type plate,
- complying with the threshold values specified in the data sheet and the instructions,
- monitoring equipment / protection devices are connected correctly,
- service and repair work not described in these instructions are performed by Bühler Technologies GmbH,
- genuine spare parts are used.

These operating instructions are a part of the equipment. The manufacturer reserves the right to change performance-, specification- or technical data without prior notice. Please keep these instructions for future reference.

Signal words for warnings

DANGER	Signal word for an imminent danger with high risk, resulting in severe injuries or death if not avoided.
WARNING	Signal word for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	Signal word for a hazardous situation with low risk, resulting in damaged to the device or the property or minor or medium injuries if not avoided.
NOTICE	Signal word for important information to the product.

Warning signs

These instructions use the following warning signs:

	Warns of a general hazard		Warns of limbs being crushed
	Warns of voltage		General notice
	Warns not to inhale toxic gasses		Unplug from mains
	Warns of corrosive liquids		Wear respiratory equipment
	Warns of explosive areas		Wear a safety mask
	Warns of hot surfaces		Wear gloves

2.2 General hazard warnings

Installation into a complete system can pose new hazards on which the manufacturer of this sample gas pump has no bearing. If necessary, perform a risk assessment of the complete system this product will be installed into.

When configuring and building the complete system the relevant national safety regulations for the installation site and the generally applicable state of the art must be observed. These can be determined through applicable harmonised standards, among other things, e.g. **IEC 60079-14**. Additional national regulations pertaining to initial operation, operation, maintenance, repairs and disposal must be observed.

When conveying flammable gasses, avoid potential exothermic reactions in your system, do not use materials with a catalytic effect in the conveyor lines. Dangerous rises in temperature could result. Sample gas pump materials in contact with media are listed in this operating manual to facilitate the safety assessment.

Adiabatic compression is part of the physical operating principle of bellows pumps. Dangerous rises in temperature cannot be ruled out with improper exceeding of the operating parameters. Conveying flammable gasses then pose an explosion hazard.

Avoid these dangerous circumstances. If necessary, the complete system should be secured against flashback. Follow these notices and the applicable national regulations, prevent malfunctions to avoid personal injury and property damage.

The operator of the system must ensure:

- The equipment is only installed by a professional familiar with the safety requirements and risks,
- Safety notices and operating instructions are available and observed,
- The permissible data and operating conditions are observed,
- Protective devices are used and mandatory maintenance is performed,
- Legal regulations are observed during disposal.

Maintenance, Repair

Please note during maintenance and repairs:

- Repairs to the unit must be performed by Bühler authorised personnel.
- Only perform conversion-, maintenance or installation work described in these operating and installation instructions.
- Always use genuine spare parts.
- Do not install damaged or defective spare part. If necessary, visually inspect prior to installation to determine any obvious damage to the spare parts.

Always observe the applicable safety and operating regulations in the respective country of use when performing any type of maintenance.

DANGER **Electrical voltage**

Electrocution hazard.

a) Disconnect the device from power supply.

b) Make sure that the equipment cannot be reconnected to mains unintentionally.

c) The device must be opened by trained staff only.

d) Regard correct mains voltage.

DANGER **Danger of explosions, danger of poisoning from poisonous corrosive gases**

During maintenance work, depending on the medium used, explosive and/or poisonous corrosive gases could escape, and this could lead to a danger of explosion or could be hazardous to health.

a) Inspect the leak tightness of your sampling system before putting the device into operation.

b) Ensure that gases that are hazardous to health are discharged safely.

c) Turn off the gas supply before beginning any maintenance or repair work and flush the gas lines with inert gas or air. Secure the gas supply so that it cannot be turned on unintentionally.

d) Protect yourself during maintenance from poisonous / corrosive gases. Wear appropriate protective equipment.

DANGER

Explosion hazard

Life and explosion risk may result from gas leakage due to improper use.

a) Use the devices only as described in this manual.

b) Regard the process conditions.

c) Check tubes and hoses for leakage.

DANGER

Adiabatic compression (explosion hazard)!

In case of adiabatic compression, high gas temperatures may occur. The operator is responsible to consider this situation.
Make sure to obey the allowed technical specifications and ambient conditions, take special attention to the media temperature with respect to temperature class T4...T3. These vary in addition to gas composition and ambient conditions. Where necessary, the operator must install temperature sensors for monitoring and must automatically shut down the sample gas pump should the temperature exceed the limits.

DANGER

DANGER - Explosion danger in case of high temperatures

Temperature of the device depends on the medium temperature. Correlation between medium temperature and **temperature classes** is given in chapter “Technical data”.
Observe maximum temperature classes T4...T3 for the pumps and the allowed ambient temperatures and medium temperatures.

DANGER

Danger of explosion due to exothermic reactions

Avoid catalytic materials in the conveyor pipelines and other materials, e.g. male stud couplers, connecting to the sample gas pump.
Depending on the particular medium conveyed (e.g. ethylene oxide), a polymerisation of the medium may occur. Heat build-ups are possible and constitute an ignition source. If necessary, for clarification consult a technical department that possesses sufficient chemical expertise.

CAUTION

Tilting risk

Damage of the device
Secure the device against any sudden translocation during maintenance.

CAUTION

Hot surface

Burning hazard
According to the product type and operation conditions, the temperature may exceed 50 °C during operation.
Depending on the conditions at the installation site it may be necessary to provide these areas with appropriate warning signs.

3 Transport and storage

The products should be transported only in its original packaging or a suitable replacement.

When not in use, protect the equipment against moisture and heat. Keep it in a covered, dry and dust-free room at a temperature of -20 °C to +40 °C.

Outdoor storage is **forbidden**. As a matter of principle, the operator must regard all applicable standards according prevention of damage due to lightning, which may otherwise damage the sample gas pump.

The storage room must not be equipped with any ozone-producing devices like fluorescent light sources, mercury arc lamps, electric high voltage devices.

4 Installation and connection

Remove any transport locks on the fan blade and check the equipment for damage prior to installation. This could be a damaged housing, supply cables, etc., among other things. Never use equipment with obvious damage.

CAUTION

Use appropriate tools

According to DIN EN 1127-1, the operator is responsible to select and use appropriate tools.

4.1 Requirements to installation site

CAUTION

Damage to the device

Protect the equipment against dust, falling objects and external impacts.

Stroke of lightning

Outdoor installation is **forbidden**. As a matter of principle, the operator must regard all applicable standards according prevention of damage due to lightning, which may otherwise damage the device.

CAUTION

Avoid vibrations and resonances

The operator is responsible to mount the pump in a way that vibrations and resonance do not cause premature failure resulting in creating an effective ignition source.

The installation and the connection as well as the dismanteling of the sample gas pump have to be made in an EX-free area and in cooled down condition.

Sample gas pump P1.3 is a built-in unit and must be operated within an enclosure that provides sufficient protection against touching live or moving parts (fan) (IP54). Ingress of water or dust and dirt must be prevented.

Air ventilation must not be obstructed and exhausted air - including air from adjacent units - must not be sucked in directly.

The motor is suitable for ambient temperatures between 0 °C to +50 °C and altitude of height ≤ 1000 m above sea level.

Please refer to chapter “Appendices [> page 29]” of this manual for further information about ambient parameters at the installation site.

4.2 Installation

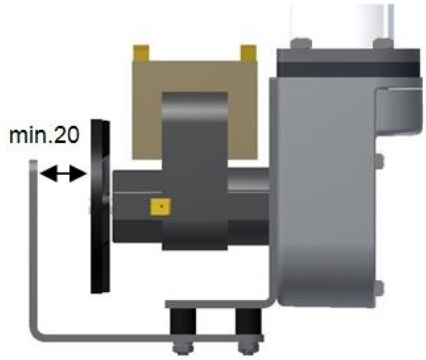
CAUTION

Damage to the device

Protect the device, especially the gas inlets and tubes, against dust, falling parts and external impact.

Use suitable rubber-metal buffers when installing to mounting plates. We recommend buffers with a diameter or 10 mm, a height of 10 mm and a shore hardness of 70. These are also available from us.

The base angle of the sample gas pump features 4x M4 tapped holes for mounting the buffers. Suitable buffers and assembly brackets are accessories which may be ordered separately from us.



When installing the sample gas pump, always ensure an adequate amount of space between the motor and the back wall (20 mm).

When using a sample gas pump with housing (type P1.3E), the required spacing between the housing and back wall is 50 mm. This is based on the minimum required bend in the connection line.

The specific mounting brackets for the different product versions are available as accessories. Using the correct mounting bracket ensures the proper spacing between the device and the back wall.

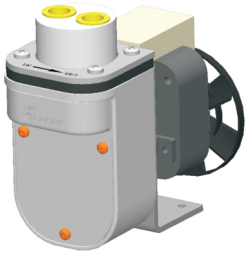
4.3 Special condition moist sample gas

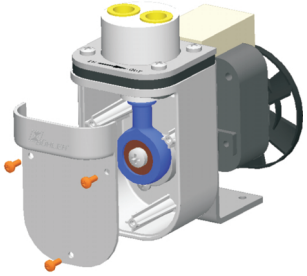
Applications where the sample gas is still moist may result in condensate forming in line and the pump body. In these events the pump head must be suspended (pump body facing down).

If the pump was not ordered this way, it can easily be converted on site.

Install the line between the gas output and condensate drain with a grade so the condensate can drain and does not collect inside the pump or the lines.

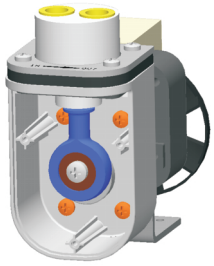
4.3.1 Conversion to pump body pointing down

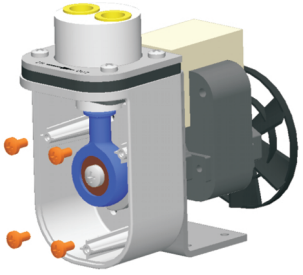




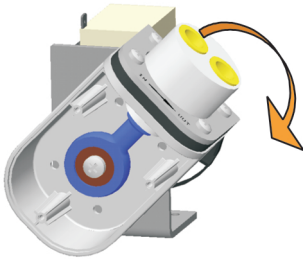
Loosen the 3 Torx screws (M3x8) on the front cover (Torx T10).

Remove the cover.





Loosen and remove the 4 Torx screws (M4x6) on the console (Torx T20).



Carefully turn the pump unit 180°.

Then reinstall the 4 Torx screws and tighten to 3 Nm.

Before tightening the screws be sure the pump unit is centered in the base angle.

Now reinstall the front cover and secure using the 3 M3x8 Torx screws.

4.4 Connecting the gas lines

A minimum of 20 cm of tubing or piping must be installed between the sample gas pump and other system elements installed in the gas outlet according to the flow chart (e.g. cooler, analyser, filter, flow regulator, etc.) to ensure compliance with the temperature classes.

The G1/4" threaded holes for the respective screw-in connections are factory closed with plastic plugs to protect from dirt. Screw-in connections are generally not included in delivery, but are sold separately for metric or for imperial installation.

Avoid mixed-material installation, i.e. piping on plastic bodies. If this cannot be avoided in isolated applications, screw the metal connections into the PTFE pump body with care, never use force.

Lay the lines so the line at the inlet and outlet remains flexible for an adequate distance (pump vibrates).

The pumps are marked **"In"** for inlet and **"Out"** for outlet. Be sure the gas line connections are tight.

4.4.1 Monitoring the sample gas pump

NOTICE

When following preventive maintenance according to the maintenance plan, a crack in the bellows is a rare malfunction, but cannot be completely eliminated.

NOTICE

If the bellow cracked, turn the pump off immediately!

NOTICE

If flammable gases (even above upper explosion limit (UEL)) or toxic gases are supplied, continuous monitoring of the pump is mandatory.

DANGER

Explosion hazard, danger of poisoning!

A crack in the bellows when conveying flammable or poisonous gasses may allow explosive or poisonous gas mixtures to leak or develop.
Monitor the pump with a flow- and/or vacuum monitoring system (see flow diagram).
If a pump defect occurs, shut it off immediately.

4.4.1.1 General monitoring measures

Since a crack **in the bellow allows** the ambient atmosphere to be sucked in and the sample gas pump continues to generate pressure, **the bellows of the sample gas pumps must be inspected regularly.**

In addition, the flow rate of the pump (to the sample gas outlet) must be monitored with a suitable flow meter.

For more information or Inspecting the bellow the maintenance schedule, please refer to the chapter Maintenance at the end of the operating and installation instructions.

4.4.1.2 Monitoring measures when conveying flammable and/or toxic gasses

Conveying flammable and/or toxic gasses **further requires** continuous monitoring **of the sample gas** pump during operation. This can be done as follows (1) or (2).

1. Flow rate monitor before the pump's gas inlet and after the gas outlet. A sudden reduction of the suction volume / flow volume ahead of the pump and consistent or suddenly increased flow volume after the pump indicates a defective bellow (the pump can convey ambient air suctioned in due to the tear).
2. Vacuum monitoring before the pump's gas inlet and flow monitoring after the gas outlet (see illustration). A sudden drop in the vacuum before the gas inlet indicates a defective bellow.

When conveying flammable gasses above the upper explosive limit (UEL) we further recommend monitoring the lower explosive limit (LEL) in the installation location.

When conveying toxic gasses we recommend MAC monitoring (MAC: Maximum Workplace Concentration) at the installation site.

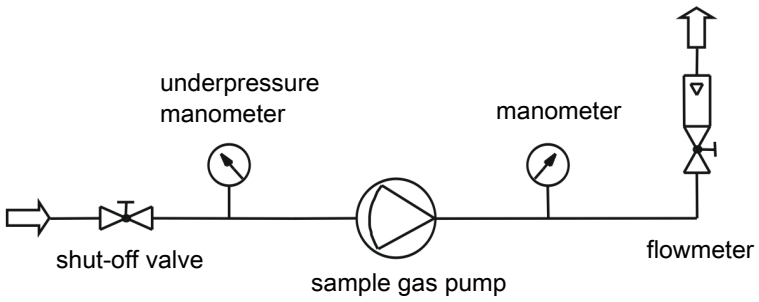


Fig. 1: Sample flow diagram of suitable monitoring

4.5 Electrical connections

DANGER	**Explosion hazard**
EX	Do not connect or disconnect equipment when a flammable or combustible atmosphere is present.

WARNING	**Hazardous electrical voltage**
	The device must be installed by trained staff only.

WARNING	
EX	Regard National directives concerning installation and operation of electrical devices in hazardous areas when installing and commissioning the motor (e. g. EN 60079-14).

CAUTION	**Wrong mains voltage**
	Wrong mains voltage may damage the device. Regard the correct mains voltage as given on the type plate.

A switch or circuit breaker (in accordance with IEC 60947-1 and IEC 60947-3) is to be provided. This must be organized to be easily accessible for the operator. The switch must be labelled as an isolating device for the unit. It must not be inserted into a mains power line or interrupt the protective conductor. Furthermore, the switch must separate the sample gas pump from the live parts for all the poles.

The device must be operated with the factory-installed motor. The operator must not replace the device or the motor with a different model.

The sample gas pump must be secured against unacceptable excessive warming by using a suitable overload protection (motor protection circuit breaker). Sample gas pumps with a BLDC motor have already integrated protection against excessive warming in the motor electronics.

Observe the rated current for the protective switch (230 V = 0,48 A, 115 V = 0,84 A, 24 V DC = 0,8 A, 12 V DC = 1,55 A).

Make sure that mains voltage and frequency meet the specifications of the motor (voltage tolerance ± 5 % and frequency tolerance ± 2 %).

The electrical connection of type P1.3 (115 V/230 V) is made with the help of flat connectors size 6,3 mm.

Sample gas pumps of type P1.3 (12 V DC/24 V DC) and P1.3E (all voltages) are delivered as standard with a 3 m connecting cable.

It is essential to connect the protective earth conductor to the marked protection earth terminal. At model P1.3E (115 V/230 V) the protective earth has to be connected to the green/yellow wire of the connection cable (see Fig. Electrical connection P1.3 pumps).

Select mains and protection earth cross section according to the rated current.

For the electrical connections especially for the protective conductor use a cable cross-section from minimum 0,75 mm^2.

Obey differing specifications on the type plate. The conditions at the installation site must meet all specifications on the type plate.

All parts under voltage must be protected through appropriate measures against contact by persons or foreign body procedures.

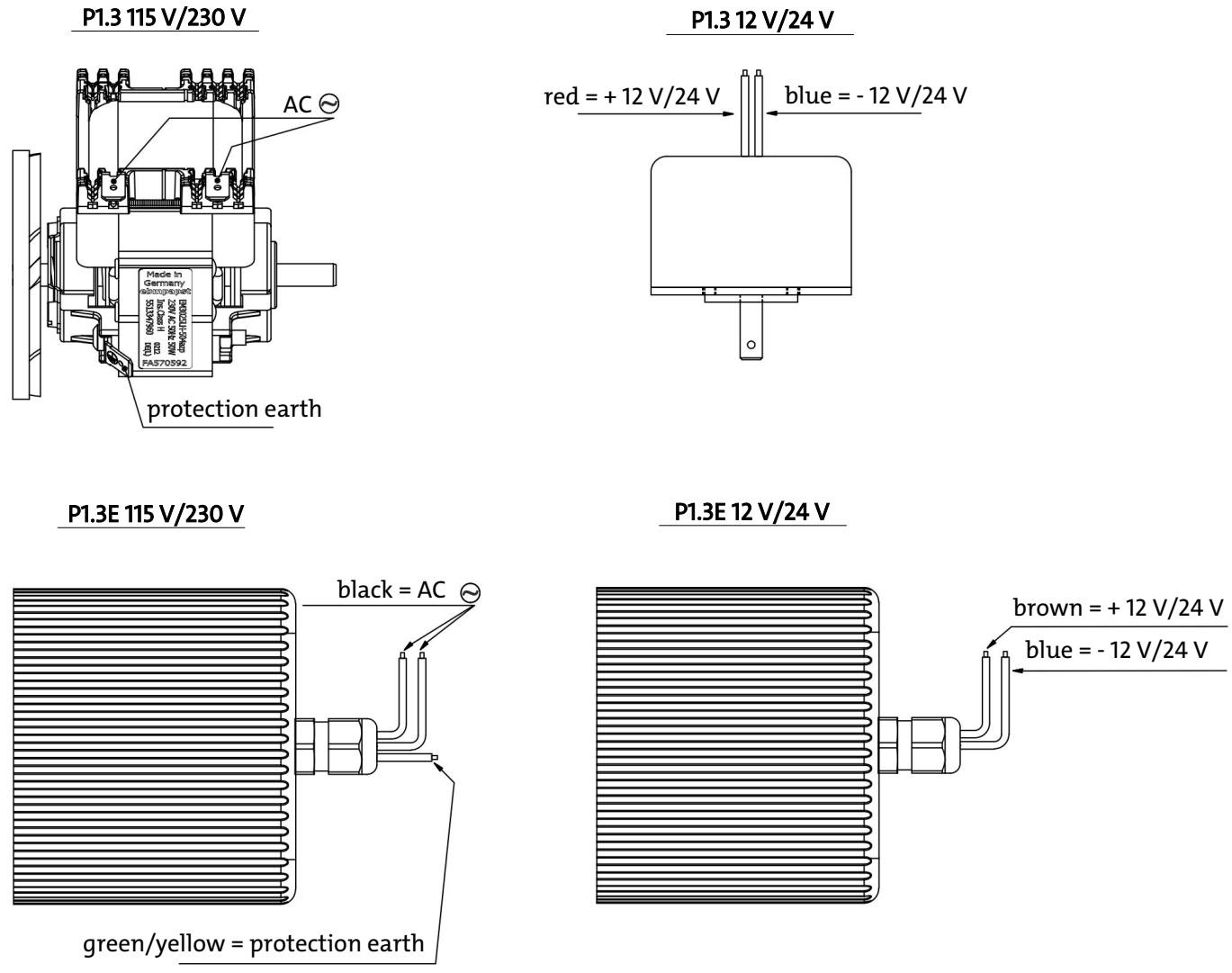


Fig. 2: Electrical connection P1.3 pumps

5 Operation and control

NOTICE

The device must not be operated beyond its specifications.

DANGER

Danger of explosions, danger of poisoning from poisonous corrosive gases

During maintenance work, depending on the medium used, explosive and/or poisonous corrosive gases could escape, and this could lead to a danger of explosion or could be hazardous to health.

a) Inspect the leak tightness of your sampling system before putting the device into operation.

b) Ensure that gases that are hazardous to health are discharged safely.

c) Turn off the gas supply before beginning any maintenance or repair work and flush the gas lines with inert gas or air. Secure the gas supply so that it cannot be turned on unintentionally.

d) Protect yourself during maintenance from poisonous / corrosive gases. Wear appropriate protective equipment.

DANGER

Adiabatic compression (explosion hazard)!

In case of adiabatic compression, high gas temperatures may occur. The operator is responsible to consider this situation.
Make sure to obey the allowed technical specifications and ambient conditions, take special attention to the media temperature with respect to temperature class T4...T3. These vary in addition to gas composition and ambient conditions. Where necessary, the operator must install temperature sensors for monitoring and must automatically shut down the sample gas pump should the temperature exceed the limits.

DANGER

Dangerous electrostatic charge (explosion hazard)

Conveying e.g. very dry and particle-loaded gasses can result in incendive electrostatic charges in the bellow / pump body.
Install particle filtration with an appropriately fine filter ahead of the pump gas input.
Sampling explosive gaseous media (max. zone 2) with P1.3 / P1.3E pumps is prohibited if the gas flow results in an incendive electrostatic charge in the bellow / pump body (projected surface in the bellow / pump body ~ 9 cm^2).

CAUTION

Hot surface

Burning hazard
According to the product type and operation conditions, the temperature may exceed 50 °C during operation.
Depending on the conditions at the installation site it may be necessary to provide these areas with appropriate warning signs.

5.1 Switching on the sample gas pump

Before switching on the unit, check:

- the hose- and electrical connections are not damaged and correct installed.
- no parts of the sample gas pump have been removed (e.g. cover).
- the gas inlet and outlet of the sample gas pump are not closed.
- the pre-pressure is below 0.3 bar.
- a bypass is installed for continuous operation for throttling below 150 L/h
- ambient parameters are met.
- data on the rating plate is met.
- the voltage and frequency of the motor match the mains values.
- electrical connections are securely connected and monitoring devices are connected and set as prescribed.
- air inlets and cooling surfaces are clean.
- ventilation slots in the housing cover are not covered or dirty, but are freely accessible.
- precautions have been taken; earthing!
- the necessary safety and monitoring devices, depending on the application, are installed and functional (e.g. protective motor switch, manometer, flame arrester, temperature monitor, depending on pump type).

When switching the sample gas pump on make sure that

- no abnormal sounds or vibrations occur.
- the flow rate is neither too low nor too high. This would indicate a cracked bellow.

5.2 Operating the sample gas pump

CAUTION

Risk of injury by moving parts

The device may be damaged if it falls down of by impacts. Pay attention to any accessible moving parts.
Operation without cover or with damaged cover is not allowed!

The sample gas pump is suitable for delivering gases only. It is not suitable for liquids.

The sample gas pump should be operated without pressure. A system pressure above 0.3 is not allowed. The gas outlet must not be closed. The flow rate must be at least 50 l/h (150 l/h with system pressure 0.3 bar). If the flow rate continuously is throttled below 150 l/h during operation, the flow rate must be controlled with a bypass valve.

NOTICE

Extreme throttling reduces the life time of the bellow.

If the pump is equipped with a bypass valve, the flow rate can be adjusted. Do not apply force when turning the valve, because the valve may be damaged otherwise! The turning range of the valve is about 5 turns.

6 Maintenance

Maintenance work on the device must be carried out in non hazardous area and cooled state. In particular cleaning work with pressurized air must only be carried out in an non hazardous area.

During maintenance, remember:

– The equipment must be maintained by a professional familiar with the safety requirements and risks.
– Only perform maintenance work described in these operating and installation instructions.
– When performing maintenance of any type, observe the respective safety and operation regulations.

NOTICE

Please refer to the spare parts drawings attached when performing maintenance.

DANGER

Electrical voltage

Electrocution hazard.

a) Disconnect the device from power supply.
b) Make sure that the equipment cannot be reconnected to mains unintentionally.
c) The device must be opened by trained staff only.
d) Regard correct mains voltage.

CAUTION

Tilting risk

Damage of the device
Secure the device against any sudden translocation during maintenance.

CAUTION

Gas leakage

The sample gas pump should not be dismantled under pressure.

CAUTION

Use appropriate tools

According to DIN EN 1127-1, the operator is responsible to select and use appropriate tools.

DANGER

Danger of explosions, danger of poisoning from poisonous corrosive gases

During maintenance work, depending on the medium used, explosive and/or poisonous corrosive gases could escape, and this could lead to a danger of explosion or could be hazardous to health.

a) Inspect the leak tightness of your sampling system before putting the device into operation.
b) Ensure that gases that are hazardous to health are discharged safely.
c) Turn off the gas supply before beginning any maintenance or repair work and flush the gas lines with inert gas or air. Secure the gas supply so that it cannot be turned on unintentionally.
d) Protect yourself during maintenance from poisonous / corrosive gases. Wear appropriate protective equipment.

DANGER	**Explosion hazard due to incorrect replacement of components**
	The replacement of the components requires carefulness. Inexpert operation could lead to explosion. If you feel uncertain about any details of the operation, please bear in mind that the replacement should be done by the manufacturer only.

CAUTION	**Hot surface**
	Burning hazard According to the product type and operation conditions, the temperature may exceed 50 °C during operation. Depending on the conditions at the installation site it may be necessary to provide these areas with appropriate warning signs.

Depending on the quality of the sample gas to be pumped it may be neccessay to replace the valves at inlet and outlet from time to time (see chapter „Replacing the inlet and outlet valves“).

If the valves are heavily contaminated, in particular after just a short period of operation, then you should provide for particle filtration before the pump. This will increase the service life considerably.

6.1 Maintenance plan

Component	Duration in hours of operation	Work to be carried out	To be carried out by
Screws of the pump body	After 500 h	Tighten the screws to 3 Nm	Customer
Entire pump	Every 500 h	Inspect hose connections, protective and control devices, for correct functioning, contamination, leakages. In the event of any damage, replace and/or have it repaired by Bühler Technologies.	Customer
Entire pump	Every 8,000 h or in the event of heavy soiling	Cleaning of the entire pump, see “Cleaning the pump console”.	Customer
Entire pump	Six years from date of manufacture	Replace the entire pump	Customer
Valves	Every 8,000 h or in the event of pressure drop	Inspect the valves, replace if necessary, see “Replacing inlet and outlet valves”.	Customer
Bellow	Every 4,000 h or six months	Inspect by shutting off the suction line. Repair any damage, see “Inspecting the bellow”.	Customer
Bellow	After two years	Replace the bellow, see “Replacing the bellow”.	Customer

6.2 Inspecting the bellow

NOTICE

When following preventive maintenance according to the maintenance plan, a crack in the bellows is a rare malfunction, but cannot be completely eliminated.

NOTICE

If the bellow cracked, turn the pump off immediately!

NOTICE

If flammable gases (even above upper explosion limit (UEL)) or toxic gases are supplied, continuous monitoring of the pump is mandatory.

DANGER

Explosion hazard, danger of poisoning!

A crack in the bellows when conveying flammable or poisonous gasses may allow explosive or poisonous gas mixtures to leak or develop.
Monitor the pump with a flow- and/or vacuum monitoring system (see flow diagram).
If a pump defect occurs, shut it off immediately.

Since a crack **in the bellow allows** the ambient atmosphere to be sucked in and the sample gas pump continues to generate pressure, **the bellow on the sample gas pump must be inspected regularly**.

This is done by connecting a suitable shut-off unit and a suitable vacuum pressure gauge ahead of the sample gas input (see illustration). If during operation, after closing the suction line, no negative pressure is produced, the bellows is defective and must be replaced.

Please refer to the Maintenance schedule for maintenance intervals.

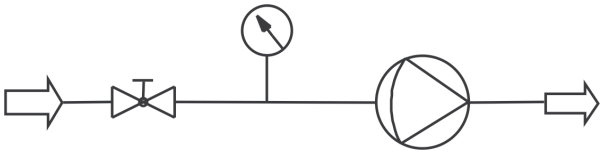
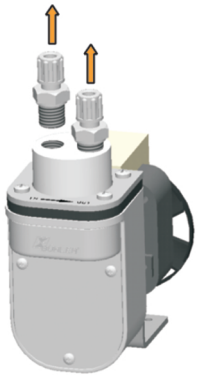
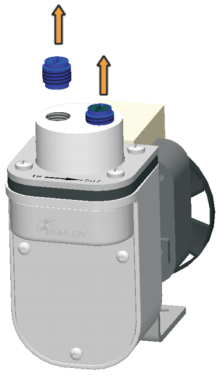


Fig. 3: Inspecting the bellow

6.3 Replacing the inlet and outlet valves



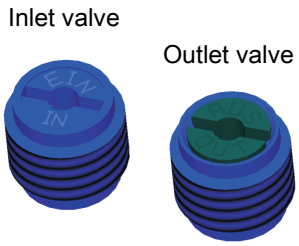


First detach the screw connections.

Unscrew the inlet or outlet valve with a wide slot screwdriver.

Attention: The PVDF and PVDF with bypass valve pump bodies already have PTFE gaskets installed in the gas inlets and outlets. These are also included in the valve spare parts kit. Remove the old gaskets before installing the new ones.

The inlet and outlet valves are identical. Their installation position determines the function. As shown in the image, the valves are blue on one side and black on the other. The valves are further marked “IN” or for inlet and “OUT” for outlet.

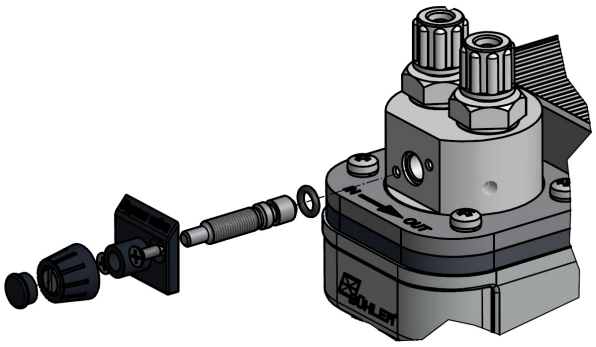


To assemble the sample gas pump, perform the steps in reverse order. When tightening the inlet and outlet valves be sure to observe the required tightening torque of max. 1 Nm. **CAUTION! Tightening the valves more will permanently deform the pump body, requiring replacement.**

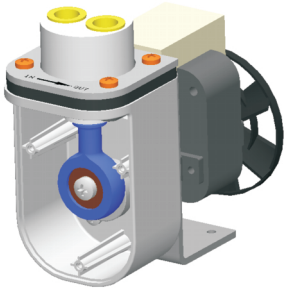
When installing the screw connection, ensure the connection is tight.

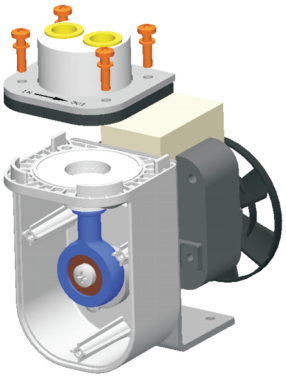
6.4 Replacing the O-ring on the bypass valve (optional)

- Loosen the two screws on the valve plate and carefully remove the entire unit.
- Coat the new O-ring with suitable O-ring grease (e.g. Fluoronox S90/2) and install in the spindle.
- Carefully insert the entire unit into the pump body while turning and tighten screws.



6.5 Replacing parts inside the pump housing

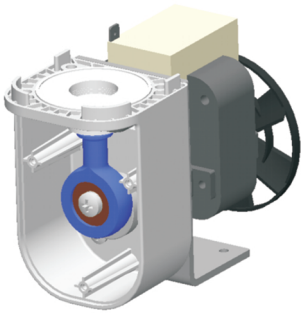


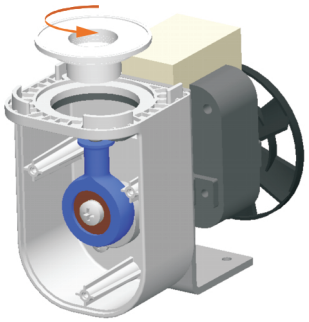


First detach the screw-in connections as described in chapter „Conversion to pump body pointing down“.

Loosen the 4 Torx screws M4x18 (Tx20) and lift the pump head along with mounting ring and foam cover off the console.

6.6 Replacing the bellow





To replace the bellow carefully unscrew it from the connecting rod counter clockwise. Be sure not to lose any installed shims.

Before reinstalling the bellow be sure it is not damaged.

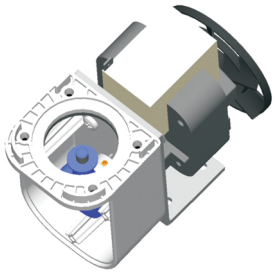
Reinstall hand tight in reverse order.

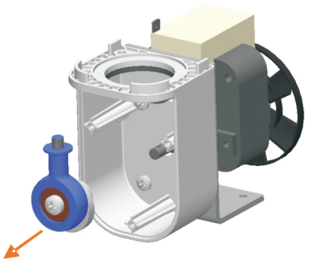
6.7 Crank gear replacement

NOTICE

Restrictions for connecting rod-eccentric replacement

The individual replacement of the eccentric, connecting rod or bearings is not allowed. Only the factory pre-assembled connecting rod-eccentric combination is suitable for replacement by the operator.





The crank gear consists of the connecting rod with ball bearing and eccentric.

After removing the bellow remove the set-screw inside the eccentric M3 using a size 1,5 setscrew wrench (or Tx6 for torx drive depending on the screw type).

The crank gear may now be removed from the motor shaft.

Before installing the replacement part remove any rust residue on the motor shaft and coat with non-resinous oil.

Reinstall the set screw with a drop of medium-strength threadlocker. When tightening the set screw, be sure it is seated in the locking hole on the shaft. Once it touches the bore, tighten the set screw 90° more.

6.8 Assembly of the sample gas pump

If the sample gas pump was removed, install in reverse order. Be sure the sealing surfaces of the below and pump head are clean and aren't scratched (even minimal grooves can cause leaks). First evenly tighten the 4 Torx screws M4x18 at 1 Nm. Then tighten the screws to 3 Nm.

CAUTION! Tighten each screw only once at 3 Nm. The bellow and pump body material (PTFE) is very weak and has high flow properties.

Check the sample gas pumps for tightness and proper function.

6.9 Cleaning the pump console

DANGER

Electrostatic charge (Spark formation)
Clean plastic parts and labels with damp cloth only.
Inflame of dust
If the device is used in dust ambiance, remove the layer from the components regularly. Also remove the dust layer in areas difficult to access.
Conserve the protective effect of the coating
To avoid potential ignition hazard, the protective effect of the coating must not be derogated by abrasion or corrosive media and must be conserved in any case.
Refinishing or repainting is **not** allowed!
Do not use sharp or pointed tools.

– Remove the three screws on the housing cover and remove the housing cover (see chapter „Conversion to pump body pointing down“).
– Clean any dust and other dirt off the sample gas pump.
– Wipe off stubborn dirt with a damp, clean cloth (do not use solvent-containing cleaning products).
– Reinstall housing cover and tighten the three screws on the housing cover.

7 Service and repair

This chapter contains information on troubleshooting and correction should an error occur during operation.

Repairs to the unit must be performed by Bühler authorised personnel.

Please contact our Service Department with any questions:

Tel.: +49-(0)2102-498955 or your agent

If the equipment is not functioning properly after correcting any malfunctions and switching on the power, it must be inspected by the manufacturer. Please send the equipment inside suitable packaging to:

Bühler Technologies GmbH

- Reparatur/Service -

Harkortstraße 29

40880 Ratingen

Germany

Please also attach the completed and signed RMA decontamination statement to the packaging. We will otherwise be unable to process your repair order.

You will find the form in the appendix of these instructions, or simply request it by e-mail:

service@buehler-technologies.com.

7.1 Troubleshooting

CAUTION

Risk due to defective device

Personal injury or damage to property

a) Switch off the device and disconnect it from the mains.

b) Repair the fault immediately. The device should not be turned on again before elimination of the failure.

CAUTION

Hot surface

Burning hazard
According to the product type and operation conditions, the temperature may exceed 50 °C during operation.
Depending on the conditions at the installation site it may be necessary to provide these areas with appropriate warning signs.

Problem / Failure	Possible cause	Solution
Pump does not start	– Mains disrupted or not correctly mounted	– Check fitting, fuse and switches
Pump does not transport	– Valves damaged or spoiled	– Blow out valves carefully or replace them
	– Bypass valve open	– Close bypass valve
	– Bellow cracked	– Replace bellow
Pump noisy	– Crank gear worn-out	– Replace crank gear
Insufficient delivery rate	– Leakage	– Re-tighten the head screws, regard allowed torque (see chapter Assembly of the sample gas pump).
	– Bellow cracked	– Check bellow and replace it, if necessary
	– Valves damaged or spoiled	– Blow out valves carefully or replace them

Tab. 1: Trouble shooting

7.2 Spare parts and accessories

Please also specify the model and serial number when ordering parts.

Upgrade and expansion parts can be found in our catalog.

Available spare parts:

Spare part	Item no.	Pos. in spare parts drawing 42/018-Z03-01-2
Bellow	42 28 00 3	18
Set inlet/outlet valves 70 °C	42 28 06 6	2 x 23/26
O-ring bypass valve	90 09 39 8	28
Crankshaft assembly spare parts kit	42 28 06 5	6, 7, 8, 9, 10
Mounting bracket	42 28 06 0	43a
Mounting bracket for housing version	42 28 06 7	43b
Set of bumpers incl. nuts & lock washers	42 28 06 1	39, 40, 41, 42
Mounting bracket & set of bumpers	42 28 06 2	39, 40, 41, 42, 43a
Mounting bracket & set of bumpers for housing version	42 28 06 3	39, 40, 41, 42, 43b

Tab. 2: Spare parts and accessories

8 Disposal

The applicable national laws must be observed when disposing of the products. Disposal must not result in a danger to health and environment.

The crossed out wheelie bin symbol on Bühler Technologies GmbH electrical and electronic products indicates special disposal notices within the European Union (EU).

The crossed out wheelie bin symbol indicates the electric and electronic products bearing the symbol must be disposed of separate from household waste. They must be properly disposed of as waste electrical and electronic equipment.

Bühler Technologies GmbH will gladly dispose of your device bearing this mark. Please send your device to the address below for this purpose.

We are obligated by law to protect our employees from hazards posed by contaminated devices. Therefore please understand that we can only dispose of your waste equipment if the device is free from any aggressive, corrosive or other operating fluids dangerous to health or environment. **Please complete the "RMA Form and Decontamination Statement", available on our website, for every waste electrical and electronic equipment. The form must be applied to the packaging so it is visible from the outside.**

Please return waste electrical and electronic equipment to the following address:

Bühler Technologies GmbH
WEEE
Harkortstr. 29
40880 Ratingen
Germany

Please also observe data protection regulations and remember you are personally responsible for the returned waste equipment not bearing any personal data. Therefore please be sure to delete your personal data before returning your waste equipment.

9 List of chemical resistance

The wetted materials of your device are printed on the type plate.

Formula	Substance	Concentration	Teflon® PTFE	PCTFE	PEEK	PVDF	FFKM	Viton® FPM	V4A
CH_3COCH_3	Acetone		1/1	1/3	1/1	3/4	1/1	4/4	1/1
C_6H_6	Benzene		1/1	1/3	1/1	1/3	1/1	3/3	1/1
Cl_2	Chlorine	10 % wet	1/1	0/0	4/4	2/2	1/1	3/0	4/4
Cl_2	Chlorine	97 %	1/0	1/3	4/4	1/1	1/0	1/1	1/1
C_2H_6	Ethane		1/0	0/0	1/0	2/0	1/0	1/0	2/0
C_2H_5OH	Ethanol	50 %	1/1	1/3	1/1	1/1	1/1	2/2	1/0
C_2H_4	Ethene		1/0	0/0	0/0	1/0	1/0	1/0	1/0
$C_6H_5C_2H_5$	Ethylbenzene		1/0	0/0	0/0	1/1	1/0	2/0	1/0
HF	Hydrofluoric acid		1/0	0/0	0/0	2/2	2/0	4/0	3/4
CO_2	Carbon dioxide		1/1	0/0	1/0	1/1	1/0	1/1	1/1
CO	Carbon monoxide		1/0	0/0	1/1	1/1	1/0	1/0	1/1
CH_4	Methane	technically pure	1/1	0/0	1/1	1/0	1/0	1/1	1/1
CH_3OH	Methanol		1/1	1/1	1/1	1/1	1/1	3/4	1/1
CH_3Cl_2	Methylene chloride		1/0	2/0	1/0	1/0	1/0	3/0	1/1
H_3PO_4	Phosphoric acid	1-5 %	1/1	1/1	1/1	1/1	1/1	1/1	1/1
H_3PO_4	Phosphoric acid	30 %	1/1	1/1	1/1	1/1	1/1	1/1	1/1
C_3H_8	Propane	gaseous	1/1	0/0	1/0	1/1	1/0	1/0	1/0
C_3H_6O	Propenoxide		1/0	0/0	0/0	2/4	2/0	4/0	1/0
HNO_3	Nitric acid	1-10 %	1/1	1/0	1/1	1/1	1/0	1/1	1/1
HNO_3	Nitric acid	50 %	1/1	1/0	3/3	1/1	1/0	1/0	1/2
HCl	Hydrochloric acid	1-5 %	1/1	1/1	1/0	1/1	1/1	1/1	2/4
HCl	Hydrochloric acid	35 %	1/1	1/1	1/0	1/1	1/1	1/2	2/4
O_2	Oxygen		1/1	0/0	1/0	1/1	1/1	1/2	1/1
SF_6	Sulfur hexafluoride		1/0	0/0	1/0	0/0	1/0	2/0	0/0
H_2SO_4	Sulfuric acid	1-6 %	1/1	1/1	2/2	1/1	1/1	1/1	1/2
H_2S	Hydrosulphide		1/1	1/1	0/0	1/1	1/1	4/4	1/1
N_2	Nitrogen		1/1	0/0	1/0	1/1	1/0	1/1	1/0
$C_6H_5C_2H_3$	Styrene		1/1	0/0	1/0	1/0	1/0	3/0	1/0
$C_6H_5CH_3$	Toluene (Methylbenzene)		1/1	0/0	1/0	1/1	1/1	3/3	1/1
H_2O	Water		1/1	0/0	1/1	1/1	1/1	1/1	1/1

Tab. 3: List of chemical resistance

0 - resistant

1 - practically resistant

2 - partially resistant

3 - not resistant

4 - no data available

Two values are given for each medium, left number = value at 20 °C (68 °F), right number = value at 50 °C (122 °F) Temperature.

Important note

The tables headed "Chemical resistance of plastics" and "Properties of plastics materials" have been compiled from information from various producers of raw materials. The figures relate exclusively to laboratory tests on raw materials. Plastics items made from these materials are often subject to influences which cannot be detected in a laboratory test (temperature, pressure, stresses in the material, chemical substances, design features, etc.). For these reasons the figures quoted can serve only as a guideline. In case of doubt we strongly recommend that a test be carried out. No legal claims can be derived from these figures and we disclaim all liability. The chemical and mechanical resistance of a product does not suffice for the assessment of its suitability for use, for example legislation on flammable liquids (explosion protection) is to be taken into particular consideration.

Chemical resistance for other substance on request.

10 User book (Please make copies)

Maintained on	Unit no.	Operating hours	Remarks	Signature

11 Appendices

11.1 Technical data

Technical data	
Nominal voltage/current consumption:	230 V 50 Hz, 0,48 A 115 V 60 Hz, 0,84 A 12 V DC, 1,55 A 24 V DC, 0,8 A
Protection class OEM/housing & 12 V/24 V:	IP 00/IP 20
Weight (without accessories):	approx. 1,3 kg (12 V/24 V approx. 0,8 kg)
Medium temperature:	see “Temperature classes”
Surrounding temperature:	0 °C to 50 °C
Nominal output:	280 l/h
Materials in contact with media vary by configuration:	PTFE, PVDF, 1.4571, 1.4401, Viton

The gas lines are connected via screw-in connections (G1/4 thread). The respective screw-in connections as well as mounting bracket and vibration absorber are sold separately.

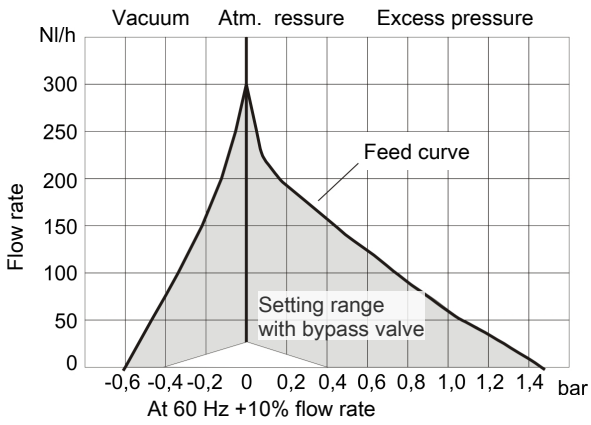
11.2 Temperature classes

Type of gas	Maximum medium temperature	Temperature class	
		at installation site	in gas path
non-flammable	50 °C	T4	---
	70 °C	T3	---
flammable	50 °C	T4	T3

11.3 Protection marking

P1.3 Atex	FM16ATEX0018X	II 3G Ex nA nC IIC T4...T3 Gc
	---	II 3/3G c IIC T3/T4 X (Examined by Bühler Technologies GmbH)
P1.3 IECEx	IECEx FMG 16.0012X	Ex nA nC IIC T4...T3 Gc
P1.3 US/Canada	Cl. I, Div. 2, Gps. A, B, C, D, T4...T3	

11.4 Feed curve

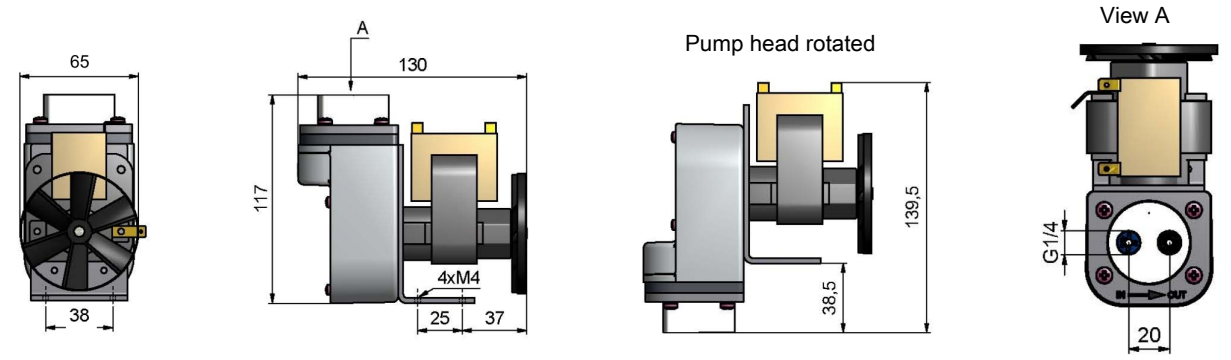


Note: The notices regarding the pressure and flow rates in chapter 5 of the operating instructions (no. 420023) must be observed!

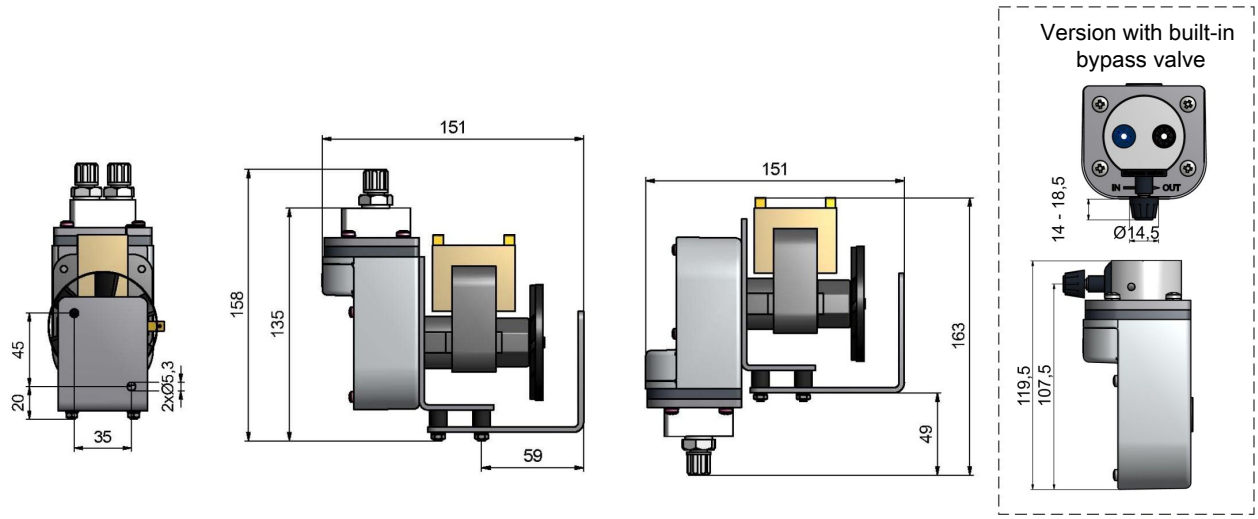
11.5 Dimensions P1.3 (115 V / 230 V)

The P1.3 sample gas pump is connected to electricity via blade receptacles..

without accessories:

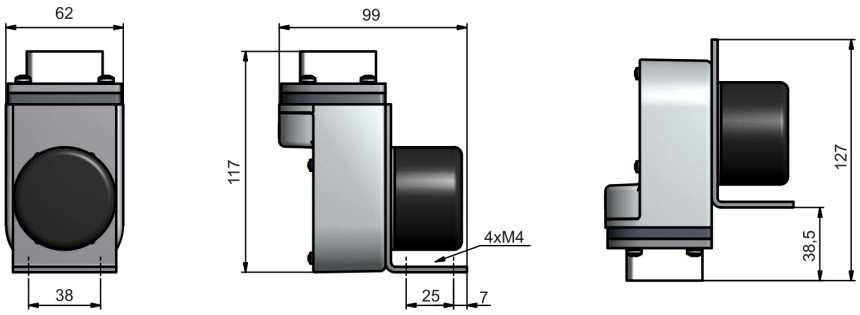


with accessories:



11.6 Dimensions P1.3 (24 V DC / 12 V DC)

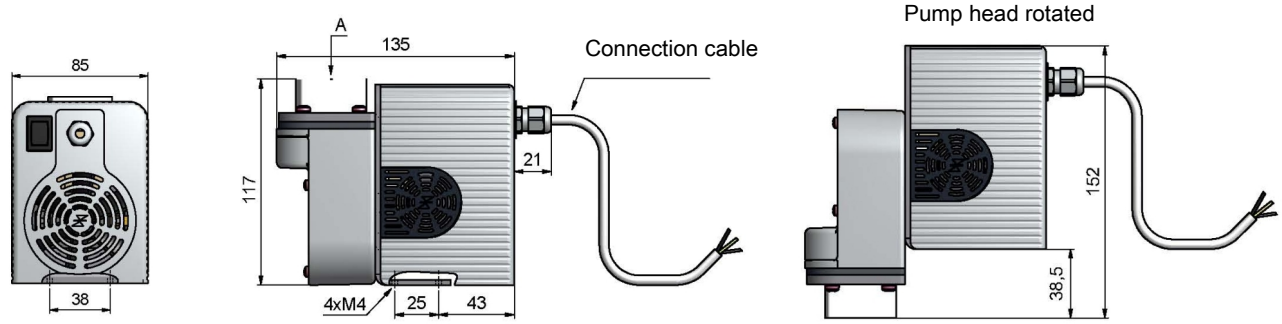
The P1.3 (24 V DC / 12 V DC) sample gas pump may be connected by standard 3 m connecting cable.



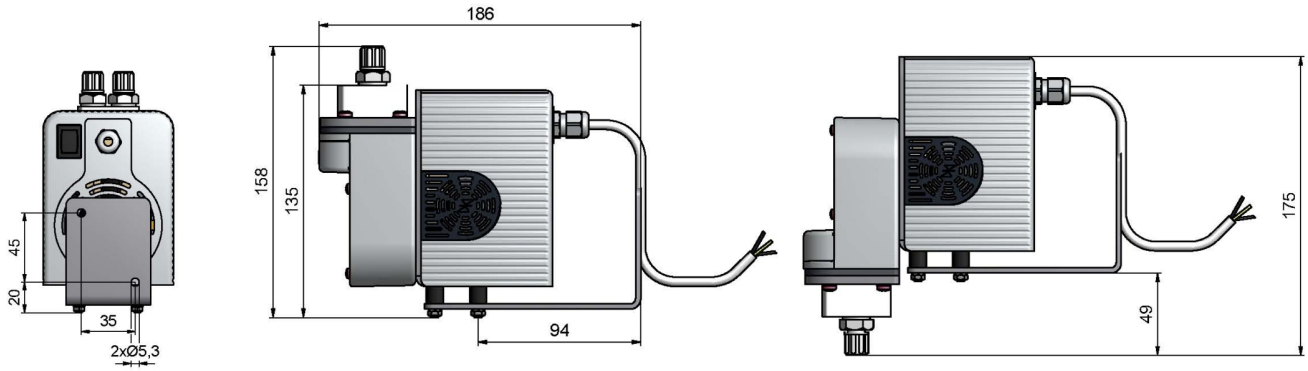
11.7 Dimensions P1.3E (all voltages)

The P1.3E sample gas pump may be connected by standard 3 m connecting cable.

without accessories:

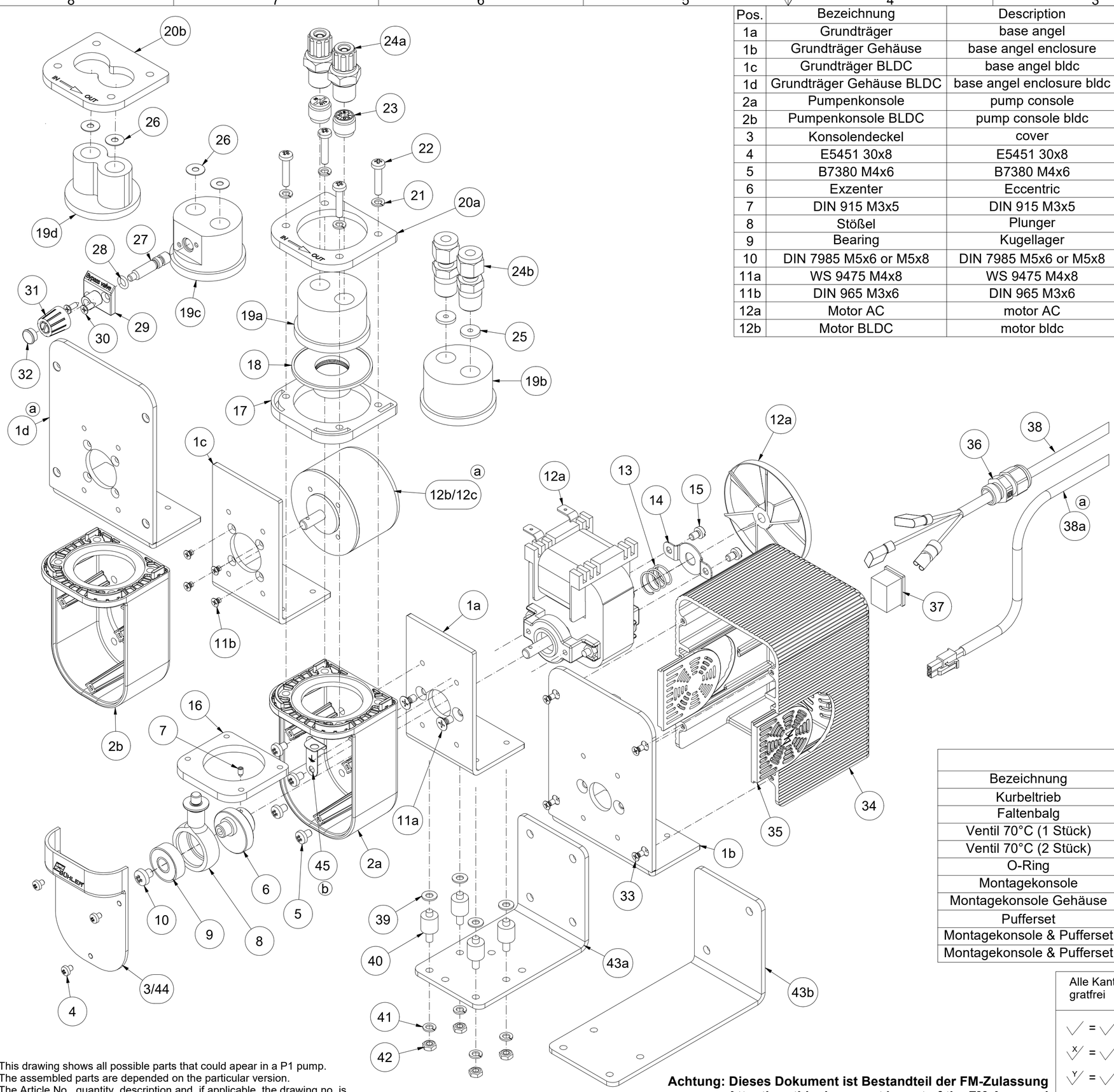


with accessories:



12 Attached documents

- Spare parts and assembly drawing: 42/018-Z03-01-2
- Certificates: FM16Atex0018X; IECEx FMG16; FM16CA0191X; FM16US0414X
- Declaration of Conformity: KX420013
- RMA – Decontamination statement



Pos.	Bezeichnung	Description
1a	Grundträger	base angel
1b	Grundträger Gehäuse	base angel enclosure
1c	Grundträger BLDC	base angel bldc
1d	Grundträger Gehäuse BLDC	base angel enclosure bldc
2a	Pumpenkonsole	pump console
2b	Pumpenkonsole BLDC	pump console bldc
3	Konsolendeckel	cover
4	E5451 30x8	E5451 30x8
5	B7380 M4x6	B7380 M4x6
6	Exzenter	Eccentric
7	DIN 915 M3x5	DIN 915 M3x5
8	Stößel	Plunger
9	Bearing	Kugellager
10	DIN 7985 M5x6 or M5x8	DIN 7985 M5x6 or M5x8
11a	WS 9475 M4x8	WS 9475 M4x8
11b	DIN 965 M3x6	DIN 965 M3x6
12a	Motor AC	motor AC
12b	Motor BLDC	motor bldc
12c	Motor BLDC mit Stecker	motor bldc with plug
13	Feder	spring
14	Erdungsblech	protective ground sheet
15	DIN 85 M4x6	DIN 85 M4x6
16	Gegenring	counter ring
17	Abdeckung	cover
18	Faltenbalg	bellow
19a	Pumpenkörper PTFE	pump head PTFE
19b	Pumpenkörper VA	pump head SS
19c	Pumpenkörper PVDF Bypass	pump head PVDF bypass
19d	Pumpenkörper PVDF	pump head PVDF
20a	Befestigungsring	mounting ring
20b	Befestigungsring nur PVDF Körper	mounting ring only PVDF head
21	DIN 127 B4,1 oder DIN 6796	DIN 127 B4,1 or DIN 6796
22	B7380 M4x20	B7380 M4x20
23	Ein- Auslassventil	In- Outletvalve
24a	Verschraubung PVDF	Fitting PVDF
24b	Verschraubung VA	Fitting SS
25	Verdränger	displacer
26	Dichtscheibe	valve sealing
27	Spindel	spindle
28	O-Ring	o-ring
29	Ventilplatte	valve plate
30	DIN 7982 2,9x9,5	DIN 7982 2,9x9,5
31	Drehknopf	knob
32	Abdeckung	cover
33	E5454 30x8	E5454 30x8
34	Gehäuseteil 1	enclosure part 1
35	Gehäuseteil 2	enclosure part 2
36	Kabelverschraubung	cable gland
37	Blindstopfen	dummy plug
38	Anschlusskabel	connection cable
38a	Anschlusskabel BLDC	connection cable bldc
39	DIN 125 A4,3	DIN 125 A4,3
40	Gummi Puffer	vibration damper
41	DIN 127 B4,1 oder DIN 6796	DIN 127 B4,1 or DIN 6796
42	DIN 934 M4	DIN 934 M4
43a	Montagekonsole	Mounting console
43b	Montagekonsole Gehäuse	Mounting console enclosure
44	Konsolendeckel mit Lüftungsschlitzen	Cover with ventilation slots
45	Potentialausgleichsblech	Equipotential bonding sheet

Ersatzteile / Spare parts			
Bezeichnung	Description	Artikel Nr. / Article no.	Pos.Nr. / Pos. no.
Kurbeltrieb	crank assembly	4228065	6/7/8/9/10
Faltenbalg	bellow	4228003	18
Ventil 70°C (1 Stück)	Valve 70°C (1 piece)	4228006	23
Ventil 70°C (2 Stück)	Valve 70°C (2 Stück)	4228066	23/26
O-Ring	O-ring	9009398	28
Montagekonsole	Mounting console	4228060	43a
Montagekonsole Gehäuse	Mounting console enclosure	4228067	43b
Pufferset	Damper set	4228061	39/40/41/42
Montagekonsole & Pufferset	Mounting console & damper set	4228062	39/40/41/42/43a
Montagekonsole & Pufferset	Mounting console & damper set	4228063	39/40/41/42/43b

This drawing shows all possible parts that could apear in a P1 pump.
The assembled parts are depended on the particular version.
The Article No., quantity, description and, if applicable, the drawing no. is shown in the parts list schematic - document "4573-A02".

Achtung: Dieses Dokument ist Bestandteil der FM-Zulassung
Attention: this document is part of the FM-Approval

Maße ohne Toleranzangabe nach ISO 2768-mK

				Datum:	Name:
				Bearb. 13.10.2015	Sundergeld
				Gepr.	

b	add pos.45	16.05.22	Sun	
a	Table+3	24.10.19	Sun	
Zust.	Änd.	Datum	Name	Ers.für:

BÜHLER Technologies GmbH 40880 Ratingen

Maßstab: 1:1,6 | Masse:

Werkstoff:

Benennung: Exploded view of the P1.x Pumps

ZeichnungsNr.: 42/018-Z03-01-2B

Art.Nr.: 42...

Arbeitsanweisung:

1 TYPE EXAMINATION CERTIFICATE

2 **Equipment or Protective systems intended for use in Potentially Explosive Atmospheres - Directive 94/9/EC**

3 **Type Examination Certificate No:** **FM16ATEX0018X**

4 **Equipment or protective system: (Type Reference and Name)** **P1.3 Sample Gas Pumps**

5 **Name of Applicant:** **Bühler Technologies GmbH**

6 **Address of Applicant:** **Harkortstraße 29**
40880, Ratingen, Germany

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and documents therein referred to.

8 FM Approvals Ltd. certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report number:

3057155 dated 11th April 2016

9 Compliance with the Essential Health and Safety Requirements, with the exception of those identified in item 15 of the schedule to this certificate, has been assessed by compliance with the following documents:

EN 60079-0:2012 +A11:2013 and EN 60079-15:2010

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This Type Examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment or protective system shall include:

II 3 G Ex nA nC IIC T4…T3 Gc Ta = 0°C to +50°C

cn=Mick Gower, o=FM Approvals, ou, email=mick.gower@fmapprovals.com, c=GB
2016.04.15 14:20:47 +01'00'

Mick Gower
Certification Manager, FM Approvals Ltd.

Issue date: 15th April 2016

FM Approvals Ltd. 1 Windsor Dials, Windsor, Berkshire, UK. SL4 1RS
T: +44 (0) 1753 750 000 F: +44 (0) 1753 868 700 E-mail: atex@fmapprovals.com www.fmapprovals.com

SCHEDULE

to Type Examination Certificate No. FM16ATEX0018X

13 **Description of Equipment or Protective System:**

The P1 sample gas pumps carry gases from various processes to analyzers. The gas circuit typically has additional analysis components such as sample gas probe, filter, flow meter, cooler, etc. The sample gas pump P1 consists of the main components, the pump head and motor. An eccentric converts the rotation of the motor into an up and down motion using a connecting rod, thus producing the pump mechanism. Inside the so-called pump body, above the bellows, which facilitates the pump motion, are inlet and outlet valves. The user connects the gas circuits to the sample gas pump through screw-in connections.

The P1 sample gas pumps are available as 12Vdc, 24Vdc, 115Vac, 60Hz or 230Vac, 50Hz. The 115Vac and 230Vac sample gas pumps are available with or without a cover over the electronics and motor. The 115Vac and 230Vac sample gas pumps have internal self resetting thermal protection built into the motor. The P1.3 sample gas pump is for hazardous locations and the P1.1 sample gas pump is for the US and Canada general pupose non-hazardous locations.
Model Code Structure:
4230abc1def00. P1.3 Sample Gas Pump.
a = Motor voltage: 1, 2, 3 or 4.
b = Pump head position: 1 or 2.
c = Pump head material: 1, 2, 3 or 4.
d = Screw-in connections / pipe fitting: 0, 1, 2, 3, 5 or 6.
e = Mounting accessories: 0, 1 or 2.
f = Housing: 0 or 1

14 **Special Conditions for Safe Use:**

1. The installer shall provide transient over-voltage protection of the supply connections at a voltage not to exceed 140% of the voltage rating of the pump.
2. The apparatus shall be mounted in an enclosure providing a minimum degree of protection of IP54 in accordance with EN 60079-15, and shall be installed within a tool-secured enclosure which meets the requirements of EN 60079-0 and EN 60079-15.
3. To maintain a T4 to T3 temperature class care shall be taken to ensure the enclosure temperature does not exceed 50°C.
4. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class
Non-flammable	70°C	T4
Flammable	50°C	T4
Flammable	70°C	T3

15 **Essential Health and Safety Requirements:**

The relevant EHSRs that have not been addressed by the standards listed in this certificate have been identified and assessed in the confidential report identified in item 8.

16 **Test and Assessment Procedure and Conditions:**

This Type Examination Certificate is the result of testing of a sample of the product submitted, in accordance with the provisions of the relevant specific standard(s), and assessment of supporting documentation. It does not imply an assessment of the whole production.

Whilst this certificate may be used in support of a manufacturer's claim for CE Marking, FM Approvals Ltd accepts no responsibility for the compliance of the equipment against all applicable Directives in all applications.

This Certificate has been issued in accordance with FM Approvals Ltd's ATEX Certification Scheme.

SCHEDULE

to Type Examination Certificate No. FM16ATEX0018X

17 **Schedule Drawings**

A list of the significant parts of the technical documentation is annexed to this certificate and a copy has been kept by FM Approvals Ltd.

18 **Certificate History**

Details of the supplements to this certificate are described below:

Date	Description
15th April 2016	Original Issue.

FM Approvals Ltd. 1 Windsor Dials, Windsor, Berkshire, UK. SL4 1RS
T: +44 (0) 1753 750 000 F: +44 (0) 1753 868 700 E-mail: atex@fmapprovals.com www.fmapprovals.com

1 TYPE EXAMINATION CERTIFICATE

2 **Equipment or Protective systems intended for use in Potentially Explosive Atmospheres - Directive 2014/34/EU**

3 **Type Examination Certificate No:** **FM16ATEX0018X**

4 **Equipment or protective system: (Type Reference and Name)** **P1.3 Sample Gas Pumps**

5 **Name of Applicant:** **Bühler Technologies GmbH**

6 **Address of Applicant:** **Harkortstraße 29**
40880, Ratingen, Germany

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and documents therein referred to.

8 FM Approvals Ltd. certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report number:

3057155 dated 11th April 2016

9 Compliance with the Essential Health and Safety Requirements, with the exception of those identified in item 15 of the schedule to this certificate, has been assessed by compliance with the following documents:

EN 60079-0:2012 +A11:2013 and EN 60079-15:2010

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.

11 This Type Examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment or protective system shall include:

II 3 G Ex nA nC IIC T4…T3 Gc Ta = 0°C to +50°C

cn=Mick Gower, o=FM Approvals, ou, email=mick.gower@fmapprovals.com, c=GB
2016.12.15 11:08:04 Z

Mick Gower
Certification Manager, FM Approvals Ltd.

Issue date: 15th December 2016

FM Approvals Ltd. 1 Windsor Dials, Windsor, Berkshire, UK. SL4 1RS
T: +44 (0) 1753 750 000 F: +44 (0) 1753 868 700 E-mail: atex@fmapprovals.com www.fmapprovals.com

SCHEDULE

to Type Examination Certificate No. FM16ATEX0018X

13 **Description of Equipment or Protective System:**

The P1 sample gas pumps carry gases from various processes to analyzers. The gas circuit typically has additional analysis components such as sample gas probe, filter, flow meter, cooler, etc. The sample gas pump P1 consists of the main components, the pump head and motor. An eccentric converts the rotation of the motor into an up and down motion using a connecting rod, thus producing the pump mechanism. Inside the so-called pump body, above the bellows, which facilitates the pump motion, are inlet and outlet valves. The user connects the gas circuits to the sample gas pump through screw-in connections.

The P1 sample gas pumps are available as 12Vdc, 24Vdc, 115Vac, 60Hz or 230Vac, 50Hz. The 115Vac and 230Vac sample gas pumps are available with or without a cover over the electronics and motor. The 115Vac and 230Vac sample gas pumps have internal self resetting thermal protection built into the motor.

Model Code Structure:
4230abc1def00. P1.3 Sample Gas Pump.
a = Motor voltage: 1, 2, 3 or 4.
b = Pump head position: 1 or 2.
c = Pump head material: 1, 2, 3 or 4.
d = Screw-in connections / pipe fitting: 0, 1, 2, 3, 5 or 6.
e = Mounting accessories: 0, 1 or 2.
f = Housing: 0 or 1

14 **Specific Conditions of Use:**

1. The installer shall provide transient over-voltage protection of the supply connections at a voltage not to exceed 140% of the voltage rating of the pump.
2. The apparatus shall be mounted in an enclosure providing a minimum degree of protection of IP54 in accordance with EN 60079-15, and shall be installed within a tool-secured enclosure which meets the requirements of EN 60079-0 and EN 60079-15.
3. To maintain a T4 to T3 temperature class care shall be taken to ensure the ambient temperature does not exceed 50°C.
4. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class	
		at installation site	in gas path
Non-Flammable	50°C	T4	––
Non-Flammable	70°C	T3	––
Flammable	50°C	T4	T3

15 **Essential Health and Safety Requirements:**

The relevant EHSRs that have not been addressed by the standards listed in this certificate have been identified and assessed in the confidential report identified in item 8.

FM Approvals Ltd. 1 Windsor Dials, Windsor, Berkshire, UK. SL4 1RS
T: +44 (0) 1753 750 000 F: +44 (0) 1753 868 700 E-mail: atex@fmapprovals.com www.fmapprovals.com

SCHEDULE

to Type Examination Certificate No. FM16ATEX0018X

16 **Test and Assessment Procedure and Conditions:**

This Type Examination Certificate is the result of testing of a sample of the product submitted, in accordance with the provisions of the relevant specific standard(s), and assessment of supporting documentation. It does not imply an assessment of the whole production.

Whilst this certificate may be used in support of a manufacturer's claim for CE Marking, FM Approvals Ltd accepts no responsibility for the compliance of the equipment against all applicable Directives in all applications.

This Certificate has been issued in accordance with FM Approvals Ltd's ATEX Certification Scheme.

17 **Schedule Drawings**

A list of the significant parts of the technical documentation is annexed to this certificate and a copy has been kept by FM Approvals Ltd.

18 **Certificate History**

Details of the supplements to this certificate are described below:

Date	Description
15th April 2016	Original Issue.
15th December 2016	Supplement 1: Report Reference: – RR207245 dated 9th December 2016 Description of the Change: Temperature Class Table in Specific Conditions of Use and documentation update.

FM Approvals Ltd. 1 Windsor Dials, Windsor, Berkshire, UK. SL4 1RS
T: +44 (0) 1753 750 000 F: +44 (0) 1753 868 700 E-mail: atex@fmapprovals.com www.fmapprovals.com

1 # TYPE EXAMINATION CERTIFICATE

2 **Equipment or Protective systems intended for use in Potentially Explosive Atmospheres - Directive 2014/34/EU**

3 **Type Examination Certificate No:** **FM16ATEX0018X**

4 **Equipment or protective system: (Type Reference and Name)** **P1.3 Sample Gas Pumps**

5 **Name of Applicant:** **Bühler Technologies GmbH**

6 **Address of Applicant:** **Harkortstraße 29**
40880, Ratingen, Germany

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and documents therein referred to.

8 FM Approvals Europe Ltd. certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report number:

3057155 dated 11th April 2016

9 Compliance with the Essential Health and Safety Requirements, with the exception of those identified in item 15 of the schedule to this certificate, has been assessed by compliance with the following documents:

EN 60079-0:2012+A11:2013 and EN 60079-15:2010

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.

11 This Type Examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment or protective system shall include:

II 3 G Ex nA nC IIC T4…T3 Gc Ta = 0°C to +50°C

Digitally signed by Damien Mc Ardle
DN: cn=Damien Mc Ardle, o=FM Approvals, ou=FM Approvals Europe Ltd, email=damien.mcardle@fmapprovals.com, c=IE
Date: 2019.04.12 13:28:30 +01'00'

Damien Mc Ardle
Certification Manager, FM Approvals Europe Ltd.

Issue date: 12th April 2019

FM Approvals Europe Ltd. One Georges Quay Plaza, Dublin. Ireland. D02 E440
T: +353 (0) 1761 4200 E-mail: atex@fmapprovals.com www.fmapprovals.com

SCHEDULE

to Type Examination Certificate No. FM16ATEX0018X

13 **Description of Equipment or Protective System:**

The P1 sample gas pumps carry gases from various processes to analyzers. The gas circuit typically has additional analysis components such as sample gas probe, filter, flow meter, cooler, etc. The sample gas pump P1 consists of the main components, the pump head and motor. An eccentric converts the rotation of the motor into an up and down motion using a connecting rod, thus producing the pump mechanism. Inside the so-called pump body, above the bellows, which facilitates the pump motion, are inlet and outlet valves. The user connects the gas circuits to the sample gas pump through screw-in connections.

The P1 sample gas pumps are available as 12Vdc, 24Vdc, 115Vac, 60Hz or 230Vac, 50Hz. The 115Vac and 230Vac sample gas pumps are available with or without a cover over the electronics and motor. The 115Vac and 230Vac sample gas pumps have internal self resetting thermal protection built into the motor.

Model Code Structure:
4230abc1def00. P1.3 Sample Gas Pump.
a = Motor voltage: 1, 2, 3 or 4.
b = Pump head position: 1 or 2.
c = Pump head material: 1, 2, 3 or 4.
d = Screw-in connections / pipe fitting: 0, 1, 2, 3, 5 or 6.
e = Mounting accessories: 0, 1 or 2.
f = Housing: 0 or 1

14 **Specific Conditions of Use:**

1. The installer shall provide transient over-voltage protection of the supply connections at a voltage not to exceed 140% of the voltage rating of the pump.
2. The apparatus shall be mounted in an enclosure providing a minimum degree of protection of IP54 in accordance with EN 60079-15, and shall be installed within a tool-secured enclosure which meets the requirements of EN 60079-0 and EN 60079-15.
3. To maintain a T4 to T3 temperature class care shall be taken to ensure the ambient temperature does not exceed 50°C.
4. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class	
		at installation site	in gas path
Non-Flammable	50°C	T4	---
Non-Flammable	70°C	T3	---
Flammable	50°C	T4	T3

15 **Essential Health and Safety Requirements:**

The relevant EHSRs that have not been addressed by the standards listed in this certificate have been identified and assessed in the confidential report identified in item 8.

SCHEDULE

to Type Examination Certificate No. FM16ATEX0018X

16 **Test and Assessment Procedure and Conditions:**

This Type Examination Certificate is the result of testing of a sample of the product submitted, in accordance with the provisions of the relevant specific standard(s), and assessment of supporting documentation. It does not imply an assessment of the whole production.

Whilst this certificate may be used in support of a manufacturer's claim for CE Marking, FM Approvals Europe Ltd accepts no responsibility for the compliance of the equipment against all applicable Directives in all applications.

This Certificate has been issued in accordance with FM Approvals Europe Ltd's ATEX Certification Scheme.

17 **Schedule Drawings**

A list of the significant parts of the technical documentation is annexed to this certificate and a copy has been kept by FM Approvals Europe Ltd.

18 **Certificate History**

Details of the supplements to this certificate are described below:

Date	**Description**
15th April 2016	Original Issue.
15th December 2016	Supplement 1: Report Reference: – RR207245 dated 09th December 2016 Description of the Change: Temperature Class Table in Specific Conditions of Use and documentation update.
12th April 2019	Supplement 2: Description of the Change: Certificate transferred from FM Approvals Ltd., notified body no. 1725, to FM Approvals Europe Ltd., notified body no. 2809.

FM Approvals Europe Ltd. One Georges Quay Plaza, Dublin. Ireland. D02 E440
T: +353 (0) 1761 4200 E-mail: atex@fmapprovals.com www.fmapprovals.com

1 # TYPE EXAMINATION CERTIFICATE

2 **Equipment or Protective systems intended for use in Potentially Explosive Atmospheres - Directive 2014/34/EU**

3 **Type Examination Certificate No:** **FM16ATEX0018X**

4 **Equipment or protective system: (Type Reference and Name)** **P1.3 Sample Gas Pumps**

5 **Name of Applicant:** **Bühler Technologies GmbH**

6 **Address of Applicant:** **Harkortstraße 29**
40880, Ratingen, Germany

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and documents therein referred to.

8 FM Approvals Europe Ltd. certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report number:

3057155 dated 11th April 2016

9 Compliance with the Essential Health and Safety Requirements, with the exception of those identified in item 15 of the schedule to this certificate, has been assessed by compliance with the following documents:

EN 60079-0:2012+A11:2013 and EN 60079-15:2010

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.

11 This Type Examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment or protective system shall include:

II 3 G Ex nA nC IIC T4…T3 Gc Ta = 0ºC to +50ºC

Digitally signed by Richard Zammitt
DN: cn=Richard Zammitt, o, ou=FM Approvals Europe Limited, email=richard.zammitt@fmapprovals.com, c=IE

Richard Zammitt
Certification Manager, FM Approvals Europe Ltd.

Issue date: 07th April 2020

FM Approvals Europe Ltd. One Georges Quay Plaza, Dublin. Ireland. D02 E440
T: +353 (0) 1761 4200 E-mail: atex@fmapprovals.com www.fmapprovals.com

SCHEDULE

to Type Examination Certificate No. FM16ATEX0018X

13 **Description of Equipment or Protective System:**

The P1 sample gas pumps carry gases from various processes to analyzers. The gas circuit typically has additional analysis components such as sample gas probe, filter, flow meter, cooler, etc. The sample gas pump P1 consists of the main components, the pump head and motor. An eccentric converts the rotation of the motor into an up and down motion using a connecting rod, thus producing the pump mechanism. Inside the so-called pump body, above the bellows, which facilitates the pump motion, are inlet and outlet valves. The user connects the gas circuits to the sample gas pump through screw-in connections.

The P1 sample gas pumps are available as 12Vdc, 24Vdc, 115Vac, 60Hz or 230Vac, 50Hz. The 115Vac and 230Vac sample gas pumps have internal self resetting thermal protection built into the motor.

Model Code Structure:
4230abc1def00. P1.3 Sample Gas Pump.
a = Motor voltage: 1, 2, 3 or 4.
b = Pump head position: 1 or 2.
c = Pump head material: 1, 2, 3 or 4.
d = Screw-in connections / pipe fitting: 0, 1, 2, 3, 5 or 6.
e = Mounting accessories: 0, 1 or 2.
f = Housing: 0 or 1

14 **Specific Conditions of Use:**

1. The installer shall provide transient over-voltage protection of the supply connections at a voltage not to exceed 140% of the voltage rating of the pump.
2. The apparatus shall be mounted in an enclosure providing a minimum degree of protection of IP54 in accordance with EN 60079-15, and shall be installed within a tool-secured enclosure which meets the requirements of EN 60079-0 and EN 60079-15.
3. To maintain a T4 to T3 temperature class care shall be taken to ensure the ambient temperature does not exceed 50°C.
4. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class	
		at installation site	in gas path
Non-Flammable	50°C	T4	---
Non-Flammable	70°C	T3	---
Flammable	50°C	T4	T3

15 **Essential Health and Safety Requirements:**

The relevant EHSRs that have not been addressed by the standards listed in this certificate have been identified and assessed in the confidential report identified in item 8.

SCHEDULE

to Type Examination Certificate No. FM16ATEX0018X

16 **Test and Assessment Procedure and Conditions:**

This Type Examination Certificate is the result of testing of a sample of the product submitted, in accordance with the provisions of the relevant specific standard(s), and assessment of supporting documentation. It does not imply an assessment of the whole production.

Whilst this certificate may be used in support of a manufacturer's claim for CE Marking, FM Approvals Europe Ltd accepts no responsibility for the compliance of the equipment against all applicable Directives in all applications.

This Certificate has been issued in accordance with FM Approvals Europe Ltd's ATEX Certification Scheme.

17 **Schedule Drawings**

A list of the significant parts of the technical documentation is annexed to this certificate and a copy has been kept by FM Approvals Europe Ltd.

18 **Certificate History**

Details of the supplements to this certificate are described below:

Date	Description
15th April 2016	Original Issue.
15th December 2016	Supplement 1: Report Reference: – RR207245 dated 09th December 2016. Description of the Change: Temperature Class Table in Specific Conditions of Use and documentation update.
12th April 2019	Supplement 2: Description of the Change: Certificate transferred from FM Approvals Ltd., notified body no. 1725, to FM Approvals Europe Ltd., notified body no. 2809.
07th April 2020	Supplement 3: Report Reference: – PR455937 dated 02nd April 2020. Description of the Change: Add option for gas pump cover DC motors.

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	**IECEx FMG 16.0012X**	Page 1 of 3	Certificate history:
Status:	**Current**	Issue No: 0	
Date of Issue:	2016-04-11		
Applicant:	**Bühler Technologies GmbH** Harkortstaße 29 40880 Ratingen **Germany**		
Equipment:	**P1 Sample Gas Pumps**		
Optional accessory:			
Type of Protection:	**Type 'n'**		
Marking:	Ex nA nC IIC T4 Gc		

Approved for issue on behalf of the IECEx Certification Body: **James E. Marquedant**

Position: **Manager, Electrical Systems**

Signature:
(for printed version)

Date:
(for printed version)

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:

FM Approvals LLC
1151 Boston-Providence Turnpike
Norwood, MA 02062
United States of America

FM Approvals
Member of the FM Global Group

IECEx Certificate of Conformity

Manufacturer: **Bühler Technologies GmbH**
Harkortstaβe 29
40880 Ratingen
Germany

Manufacturing locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2011 Explosive atmospheres - Part 0: General requirements
Edition:6.0

IEC 60079-15:2010 Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
Edition:4

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

US/FMG/ExTR16.0013/00

Quality Assessment Report:

DE/BVS/QAR16.0002/00

IECEx Certificate of Conformity

EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

The P1 sample gas pump carry gases from various processes to analyzers. The gas circuit typically has additional analysis components such as sample gas probe, filter, flow meter, cooler, etc. The sample gas pump P1 consists of the main components the pump head and motor. An eccentric converts the rotation of the motor into an up and down motion using a connecting rod, thus producing the pump mechanism. Inside the so-called pump body, above the bellows, which facilitates the pump motion, are inlet and outlet valves. The user connects the gas circuits to the sample gas pump through screw-in connections.

The P1 sample gas pumps are available as 12Vdc, 24Vdc, 115Vac, 60Hz or 230Vac, 50Hz. The 115Vac and 230Vac sample gas pumps are available with or without a cover over the electronics and motor. The 115Vac and 230Vac sample gas pumps have internal self resetting thermal protection built into the motor.

SPECIFIC CONDITIONS OF USE: YES as shown below:

1. The installer shall provide transient over-voltage protection of the supply connections at a voltage not to exceed 140% of the voltage rating of the pump.

2. The pump shall be mounted in an enclosure providing a minimum degree of protection of IP54 in accordance with IEC/EN 60079-15, and shall be installed within a tool-secured enclosure which meets the requirements of IEC/EN 60079-0 and IEC/EN 60079-15.

3. The apparatus is to be installed in a tool-secured enclosure in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.

4. Temperature codes are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Code
Non-flammable	70°C	T4
Flammable	50°C	T4
Flammable	70°C	T3

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx FMG 16.0012X**

Page 1 of 4

Certificate history:
Issue 0 (2016-04-11)

Status: **Current**

Issue No: 1

Date of Issue: 2016-12-09

Applicant: **Bühler Technologies GmbH**
Harkortstaße 29
40880 Ratingen
Germany

Equipment: **P1 Sample Gas Pumps**

Optional accessory:

Type of Protection: **Type 'n'**

Marking: Ex nA nC IIC T4 Gc

Approved for issue on behalf of the IECEx Certification Body: **James E. Marquedant**

Position: **Manager, Electrical Systems**

Signature:
(for printed version)

Date:
(for printed version)

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:

FM Approvals LLC
1151 Boston-Providence Turnpike
Norwood, MA 02062
United States of America

FM Approvals
Member of the FM Global Group

IECEx Certificate of Conformity

Certificate No.: **IECEx FMG 16.0012X**

Date of issue: 2016-12-09

Manufacturer: **Bühler Technologies GmbH**
Harkortstaβe 29
40880 Ratingen
Germany

Manufacturing locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2011 Explosive atmospheres - Part 0: General requirements
Edition:6.0

IEC 60079-15:2010 Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
Edition:4

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

US/FMG/ExTR16.0013/00 US/FMG/ExTR16.0013/01

Quality Assessment Reports:

DE/BVS/QAR16.0002/00 DE/BVS/QAR16.0002/01

IECEx Certificate of Conformity

EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

The P1 sample gas pump carry gases from various processes to analyzers. The gas circuit typically has additional analysis components such as sample gas probe, filter, flow meter, cooler, etc. The sample gas pump P1 consists of the main components the pump head and motor. An eccentric converts the rotation of the motor into an up and down motion using a connecting rod, thus producing the pump mechanism. Inside the so-called pump body, above the bellows, which facilitates the pump motion, are inlet and outlet valves. The user connects the gas circuits to the sample gas pump through screw-in connections.

The P1 sample gas pumps are available as 12Vdc, 24Vdc, 115Vac, 60Hz or 230Vac, 50Hz. The 115Vac and 230Vac sample gas pumps are available with or without a cover over the electronics and motor. The 115Vac and 230Vac sample gas pumps have internal self resetting thermal protection built into the motor.

SPECIFIC CONDITIONS OF USE: YES as shown below:

1. The installer shall provide transient over-voltage protection of the supply connections at a voltage not to exceed 140% of the voltage rating of the pump.

2. The pump shall be mounted in an enclosure providing a minimum degree of protection of IP54 in accordance with IEC/EN 60079-15, and shall be installed within a tool-secured enclosure which meets the requirements of IEC/EN 60079-0 and IEC/EN 60079-15.

3. The apparatus is to be installed in a tool-secured enclosure in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.

4. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class	
		at installation site	in gas path
Non-Flammable	50°C	T4	---
Non-Flammable	70°C	T3	---
Flammable	50°C	T4	T3

IECEx Certificate of Conformity

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

In the certificate, under Specific Conditions of Use, Reformatting and changes to the Temperature Class Table for maximum gas temperature and Temperature class values. Several drawings were updated for this change . The Name Plate drawing was updated for a non-IECEx related change.

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx FMG 16.0012X**

Page 1 of 4

Certificate history:
Issue 1 (2016-12-09)
Issue 0 (2016-04-11)

Status: **Current**

Issue No: 2

Date of Issue: 2020-04-02

Applicant: **Bühler Technologies GmbH**
Harkortstaße 29
40880 Ratingen
Germany

Equipment: **P1.3 Sample Gas Pumps**

Optional accessory:

Type of Protection: **Type 'n'**

Marking: Ex nA nC IIC T4 Gc

Approved for issue on behalf of the IECEx Certification Body: **J. E. Marquedant**

Position: **VP, Manager - Electrical Systems**

Signature:
(for printed version)

Date:
(for printed version)

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:

FM Approvals LLC
1151 Boston-Providence Turnpike
Norwood, MA 02062
United States of America

FM Approvals
Member of the FM Global Group

IECEx Certificate of Conformity

Manufacturer: **Bühler Technologies GmbH**
Harkortstaβe 29
40880 Ratingen
Germany

Manufacturing locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2011 Explosive atmospheres - Part 0: General requirements
Edition:6.0

IEC 60079-15:2010 Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
Edition:4

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

US/FMG/ExTR16.0013/00 US/FMG/ExTR16.0013/01 US/FMG/ExTR16.0013/02

Quality Assessment Report:

DE/BVS/QAR16.0002/03

IECEx Certificate of Conformity

EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

The P1.3 sample gas pump carry gases from various processes to analyzers. The gas circuit typically has additional analysis components such as sample gas probe, filter, flow meter, cooler, etc. The sample gas pump P1.3 consists of the main components the pump head and motor. An eccentric converts the rotation of the motor into an up and down motion using a connecting rod, thus producing the pump mechanism. Inside the so-called pump body, above the bellows, which facilitates the pump motion, are inlet and outlet valves. The user connects the gas circuits to the sample gas pump through screw-in connections.

The P1.3 sample gas pumps are available as 12Vdc, 24Vdc, 115Vac, 60Hz or 230Vac, 50Hz. The 115Vac and 230Vac sample gas pumps have internal self resetting thermal protection built into the motor.

SPECIFIC CONDITIONS OF USE: YES as shown below:
1. The installer shall provide transient over-voltage protection of the supply connections at a voltage not to exceed 140% of the voltage rating of the pump.

2. The pump shall be mounted in an enclosure providing a minimum degree of protection of IP54 in accordance with IEC/EN 60079-15, and shall be installed within a tool-secured enclosure which meets the requirements of IEC/EN 60079-0 and IEC/EN 60079-15.

3. To maintain a T4 to T3 temperature class care shall be taken to ensure the enclosure temperature does not exceed 50°C.

4. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class	
		at installation site	in gas path
Non-Flammable	50°C	T4	---
Non-Flammable	70°C	T3	---
Flammable	50°C	T4	T3

IECEx Certificate of Conformity

Certificate No.: **IECEx FMG 16.0012X** Page 4 of 4

Date of issue: 2020-04-02 Issue No: 2

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)
Addition of gas sample covers to the DC 12VDC and 24VDC motors

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **781 762 4300** F: 781-762-9375 www.fmapprovals.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS LOCATION ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS

This certificate is issued for the following equipment:

4230abc1def00. P1.3 Sample Gas Pump.
NI/I/2/ABCD/T4…T3 Ta = 0°C to +50°C;
a = Motor voltage: 1, 2, 3 or 4.
b = Pump head position: 1 or 2.
c = Pump head material: 1, 2, 3 or 4.
d = Screw-in connections / pipe fitting: 0, 1, 2, 3, 5 or 6.
e = Mounting accessories: 0, 1 or 2.
f = Housing: 0 or 1.
Special Conditions of Use:

1. The apparatus is to be installed in a tool-secured enclosure in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.
2. To maintain a T4 to T3 temperature class care shall be taken to ensure the enclosure temperature does not exceed 50°C.
3. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class
Non-flammable	70°C	T4
Flammable	50°C	T4
Flammable	70°C	T3

Equipment Ratings:

Nonicendive for use in Class I, Division 2, Groups A, B, C and D, Temperature Class T4…T3 hazardous locations.

FM Approved for:
Bühler Technologies GmbH
Ratingen, Germany

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

CAN/CSA C22.2 No. 213	2012
CAN/CSA C22.2 No. 1010.1	2004

Original Project ID: 3057155C Approval Granted: April 11, 2016

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date

FM Approvals LLC

J.E. Marquedant
Manager, Electrical Systems

11 April 2016
Date

CERTIFICATE OF CONFORMITY

1. **HAZARDOUS LOCATION ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS**
2. **Certificate No:** **FM16CA0191X**
3. **Equipment:** **P1.3 Sample Gas Pumps**
   (Type Reference and Name)
4. **Name of Listing Company:** **Bühler Technologies GmbH**
5. **Address of Listing Company:** **Harkortstraße 29**
   40880, Ratingen, Germany
6. The examination and test results are recorded in confidential report number:

   3057155 dated 11th April 2016

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   CSA-C22.2 No. 213:2012, CAN/CSA-C22.2 No. 61010-1:2004

8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.
10. Equipment Ratings:

    Nonicendive for use in Class I, Division 2, Groups A, B, C and D, Temperature Class T4…T3 hazardous locations.

Certificate issued by:

J.E. Marquedant
Manager, Electrical Systems

9 December 2016
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

SCHEDULE

Canadian Certificate Of Conformity No: FM16CA0191X

11. The marking of the equipment shall include:

Class I Division 2, Groups A, B, C, D; T4…T3 Ta = 0°C to +50°C

12. **Description of Equipment:**

The P1 sample gas pumps carry gases from various processes to analyzers. The gas circuit typically has additional analysis components such as sample gas probe, filter, flow meter, cooler, etc. The sample gas pump P1 consists of the main components, the pump head and motor. An eccentric converts the rotation of the motor into an up and down motion using a connecting rod, thus producing the pump mechanism. Inside the so-called pump body, above the bellows, which facilitates the pump motion, are inlet and outlet valves. The user connects the gas circuits to the sample gas pump through screw-in connections.

The P1 sample gas pumps are available as 12Vdc, 24Vdc, 115Vac, 60Hz or 230Vac, 50Hz. The 115Vac and 230Vac sample gas pumps are available with or without a cover over the electronics and motor. The 115Vac and 230Vac sample gas pumps have internal self resetting thermal protection built into the motor. The P1.3 sample gas pump is for hazardous locations and the P1.1 sample gas pump is for the US and Canada general pupose non-hazardous locations.

Model Code Structure:

4230abc1def00. P1.3 Sample Gas Pump.
a = Motor voltage: 1, 2, 3 or 4.
b = Pump head position: 1 or 2.
c = Pump head material: 1, 2, 3 or 4.
d = Screw-in connections / pipe fitting: 0, 1, 2, 3, 5 or 6.
e = Mounting accessories: 0, 1 or 2.
f = Housing: 0 or 1

13. **Specific Conditions of Use:**

1. The apparatus is to be installed in a tool-secured enclosure in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.
2. To maintain a T4 to T3 temperature class care shall be taken to ensure the ambient temperature does not exceed 50°C.
3. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class	
		at installation site	in gas path
Non-Flammable	50°C	T4	---
Non-Flammable	70°C	T3	---
Flammable	50°C	T4	T3

SCHEDULE

Canadian Certificate Of Conformity No: FM16CA0191X

14. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals Canadian Certification Scheme.

15. **Schedule Drawings**

A copy of the technical documentation has been kept by FM Approvals.

16. **Certificate History**

Details of the supplements to this certificate are described below:

Date	Description
11th April 2016	Original Issue.
9th December 2016	Supplement 1: Report Reference: – RR207245 dated 9th December 2016 Description of the Change: In the certificate, under Specific Conditions of Use, Reformatting and changes to the Temperature Class Table for maximum gas temperature and Temperature class values. Several drawings were updated for this change. The Name Plate drawing was updated to correct the nonincendive marking.

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

CERTIFICATE OF CONFORMITY

1. **HAZARDOUS LOCATION ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS**
2. **Certificate No:** **FM16CA0191X**
3. **Equipment:** **P1.3 Sample Gas Pumps**
   (Type Reference and Name)
4. **Name of Listing Company:** **Bühler Technologies GmbH**
5. **Address of Listing Company:** **Harkortstraße 29**
   40880, Ratingen, Germany
6. The examination and test results are recorded in confidential report number:

   3057155 dated 11th April 2016

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   CSA-C22.2 No. 213:2012, CAN/CSA-C22.2 No. 61010-1:2004

8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.
10. Equipment Ratings:

    Nonicendive for use in Class I, Division 2, Groups A, B, C and D, Temperature Class T4…T3 hazardous locations.

Certificate issued by:

J.E. Marquedant

J.E. Marquedant
VP, Manager - Electrical Systems

2 April 2020
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

SCHEDULE

Canadian Certificate Of Conformity No: FM16CA0191X

11. The marking of the equipment shall include:

    Class I Division 2, Groups A, B, C, D; T4…T3 Ta = 0°C to +50°C

12. **Description of Equipment:**

    The P1 sample gas pumps carry gases from various processes to analyzers. The gas circuit typically has additional analysis components such as sample gas probe, filter, flow meter, cooler, etc. The sample gas pump P1 consists of the main components, the pump head and motor. An eccentric converts the rotation of the motor into an up and down motion using a connecting rod, thus producing the pump mechanism. Inside the so-called pump body, above the bellows, which facilitates the pump motion, are inlet and outlet valves. The user connects the gas circuits to the sample gas pump through screw-in connections.

    The P1 sample gas pumps are available as 12Vdc, 24Vdc, 115Vac, 60Hz or 230Vac, 50Hz. The 115Vac and 230Vac sample gas pumps have internal self resetting thermal protection built into the motor. The P1.3 sample gas pump is for hazardous locations and the P1.1 sample gas pump is for the US and Canada general pupose non-hazardous locations.

    Model Code Structure:

    4230abc1def00. P1.3 Sample Gas Pump.
    a = Motor voltage: 1, 2, 3 or 4.
    b = Pump head position: 1 or 2.
    c = Pump head material: 1, 2, 3 or 4.
    d = Screw-in connections / pipe fitting: 0, 1, 2, 3, 5 or 6.
    e = Mounting accessories: 0, 1 or 2.
    f = Housing: 0 or 1

13. **Specific Conditions of Use:**

    1. The apparatus is to be installed in a tool-secured enclosure in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.
    2. To maintain a T4 to T3 temperature class care shall be taken to ensure the ambient temperature does not exceed 50°C.
    3. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class	
		at installation site	in gas path
Non-Flammable	50°C	T4	---
Non-Flammable	70°C	T3	---
Flammable	50°C	T4	T3

SCHEDULE

Canadian Certificate Of Conformity No: FM16CA0191X

14. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals Canadian Certification Scheme.

15. **Schedule Drawings**

A copy of the technical documentation has been kept by FM Approvals.

16. **Certificate History**

Details of the supplements to this certificate are described below:

Date	Description
11th April 2016	Original Issue.
9th December 2016	Supplement 1: Report Reference: – RR207245 dated 9th December 2016. Description of the Change: In the certificate, under Specific Conditions of Use, Reformatting and changes to the Temperature Class Table for maximum gas temperature and Temperature class values. Several drawings were updated for this change. The Name Plate drawing was updated to correct the nonincendive marking.
2nd April 2020	Supplement 2: Report Reference: – PR455937 dated 2nd April 2020. Description of the Change: Add option for gas pump cover DC motors.

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **781 762 4300** F: 781-762-9375 www.fmapprovals.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

4230abc1def00. P1.3 Sample Gas Pump.
NI/I/2/ABCD/T4…T3 Ta = 0°C to +50°C;
a = Motor voltage: 1, 2, 3 or 4.
b = Pump head position: 1 or 2.
c = Pump head material: 1, 2, 3 or 4.
d = Screw-in connections / pipe fitting: 0, 1, 2, 3, 5 or 6.
e = Mounting accessories: 0, 1 or 2.
f = Housing: 0 or 1.
Special Conditions of Use:

1. The apparatus is to be installed in a tool-secured enclosure in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.
2. To maintain a T4 to T3 temperature class care shall be taken to ensure the enclosure temperature does not exceed 50°C.
3. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class
Non-flammable	70°C	T4
Flammable	50°C	T4
Flammable	70°C	T3

Equipment Ratings:

Nonicendive for use in Class I, Division 2, Groups A, B, C and D, Temperature Class T4…T3 hazardous (Classified) locations.

FM Approved for:
Bühler Technologies GmbH
Ratingen, Germany

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600	2011
Class 3611	2004
Class 3810	2005

Original Project ID: 3057155 Approval Granted: April 11, 2016

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date

FM Approvals LLC

J.E. Marquedant
Manager, Electrical Systems

11 April 2016
Date

CERTIFICATE OF CONFORMITY

1. **HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS**
2. **Certificate No:** **FM16US0414X**
3. **Equipment:** **P1.3 Sample Gas Pumps**
   (Type Reference and Name)
4. **Name of Listing Company:** **Bühler Technologies GmbH**
5. **Address of Listing Company:** **Harkortstraße 29**
   40880, Ratingen, Germany
6. The examination and test results are recorded in confidential report number:

   3057155 dated 11th April 2016
7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   FM Class 3600:2011, FM Class 3611:2004, FM Class 3810:2005
8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.
10. Equipment Ratings:

    Nonicendive for use in Class I, Division 2, Groups A, B, C and D, Temperature Class T4…T3 hazardous (Classified) locations

Certificate issued by:

J.E. Marquedant
Manager, Electrical Systems

9 December 2016
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

SCHEDULE

US Certificate Of Conformity No: FM16US0414X

11. The marking of the equipment shall include:

Class I Division 2, Groups A, B, C, D; T4…T3 Ta = 0°C to +50°C

12. **Description of Equipment:**

The P1 sample gas pumps carry gases from various processes to analyzers. The gas circuit typically has additional analysis components such as sample gas probe, filter, flow meter, cooler, etc. The sample gas pump P1 consists of the main components, the pump head and motor. An eccentric converts the rotation of the motor into an up and down motion using a connecting rod, thus producing the pump mechanism. Inside the so-called pump body, above the bellows, which facilitates the pump motion, are inlet and outlet valves. The user connects the gas circuits to the sample gas pump through screw-in connections.

The P1 sample gas pumps are available as 12Vdc, 24Vdc, 115Vac, 60Hz or 230Vac, 50Hz. The 115Vac and 230Vac sample gas pumps are available with or without a cover over the electronics and motor. The 115Vac and 230Vac sample gas pumps have internal self resetting thermal protection built into the motor. The P1.3 sample gas pump is for hazardous locations.

Model Code Structure:

4230abc1def00. P1.3 Sample Gas Pump.
a = Motor voltage: 1, 2, 3 or 4.
b = Pump head position: 1 or 2.
c = Pump head material: 1, 2, 3 or 4.
d = Screw-in connections / pipe fitting: 0, 1, 2, 3, 5 or 6.
e = Mounting accessories: 0, 1 or 2.
f = Housing: 0 or 1

13. **Specific Conditions of Use:**

1. The apparatus is to be installed in a tool-secured enclosure in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.
2. To maintain a T4 to T3 temperature class care shall be taken to ensure the ambient temperature does not exceed 50°C.
3. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class	
		at installation site	in gas path
Non-Flammable	50°C	T4	---
Non-Flammable	70°C	T3	---
Flammable	50°C	T4	T3

SCHEDULE

US Certificate Of Conformity No: FM16US0414X

14. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals US Certification Requirements.

15. **Schedule Drawings**

A copy of the technical documentation has been kept by FM Approvals.

16. **Certificate History**

Details of the supplements to this certificate are described below:

Date	Description
11th April 2016	Original Issue.
9th December 2016	Supplement 1: Report Reference: – RR207245 dated 9th December 2016 Description of the Change: In the certificate, under Specific Conditions of Use, Reformatting and changes to the Temperature Class Table for maximum gas temperature and Temperature class values. Several drawings were updated for this change. The Name Plate drawing was updated to correct the nonincendive marking.

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

CERTIFICATE OF CONFORMITY

1. **HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS**
2. **Certificate No:** **FM16US0414X**
3. **Equipment:** **P1.3 Sample Gas Pumps**
   (Type Reference and Name)
4. **Name of Listing Company:** **Bühler Technologies GmbH**
5. **Address of Listing Company:** **Harkortstraße 29**
   40880, Ratingen, Germany
6. The examination and test results are recorded in confidential report number:

   3057155 dated 11th April 2016

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   FM Class 3600:2011, FM Class 3611:2004, FM Class 3810:2005

8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.
10. Equipment Ratings:

    Nonicendive for use in Class I, Division 2, Groups A, B, C and D, Temperature Class T4…T3 hazardous (Classified) locations

Certificate issued by:

J.E. Marquedant
VP, Manager - Electrical Systems

2 April 2020
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

SCHEDULE

US Certificate Of Conformity No: FM16US0414X

11. The marking of the equipment shall include:

Class I Division 2, Groups A, B, C, D; T4…T3 Ta = 0°C to +50°C

12. **Description of Equipment:**

The P1 sample gas pumps carry gases from various processes to analyzers. The gas circuit typically has additional analysis components such as sample gas probe, filter, flow meter, cooler, etc. The sample gas pump P1 consists of the main components, the pump head and motor. An eccentric converts the rotation of the motor into an up and down motion using a connecting rod, thus producing the pump mechanism. Inside the so-called pump body, above the bellows, which facilitates the pump motion, are inlet and outlet valves. The user connects the gas circuits to the sample gas pump through screw-in connections.

The P1 sample gas pumps are available as 12Vdc, 24Vdc, 115Vac, 60Hz or 230Vac, 50Hz. The 115Vac and 230Vac sample gas pumps have internal self resetting thermal protection built into the motor. The P1.3 sample gas pump is for hazardous locations.

Model Code Structure:

4230abc1def00. P1.3 Sample Gas Pump.
a = Motor voltage: 1, 2, 3 or 4.
b = Pump head position: 1 or 2.
c = Pump head material: 1, 2, 3 or 4.
d = Screw-in connections / pipe fitting: 0, 1, 2, 3, 5 or 6.
e = Mounting accessories: 0, 1 or 2.
f = Housing: 0 or 1

13. **Specific Conditions of Use:**

1. The apparatus is to be installed in a tool-secured enclosure in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.
2. To maintain a T4 to T3 temperature class care shall be taken to ensure the ambient temperature does not exceed 50°C.
3. Temperature class are defined by the following table:

Type of Gas used in Pump	Maximum Gas Temperature	Temperature Class	
		at installation site	in gas path
Non-Flammable	50°C	T4	---
Non-Flammable	70°C	T3	---
Flammable	50°C	T4	T3

14. **Test and Assessment Procedure and Conditions:**

SCHEDULE

US Certificate Of Conformity No: FM16US0414X

This Certificate has been issued in accordance with FM Approvals US Certification Requirements.

15. **Schedule Drawings**

A copy of the technical documentation has been kept by FM Approvals.

16. **Certificate History**

Details of the supplements to this certificate are described below:

Date	Description
11th April 2016	Original Issue.
9th December 2016	Supplement 1: Report Reference: – RR207245 dated 9th December 2016. Description of the Change: In the certificate, under Specific Conditions of Use, Reformatting and changes to the Temperature Class Table for maximum gas temperature and Temperature class values. Several drawings were updated for this change. The Name Plate drawing was updated to correct the nonincendive marking.
2nd April 2020	Supplement 2: Report Reference: – PR455937 dated 2nd April 2020. Description of the Change: Add option for gas pump cover DC motors.

EU-Konformitätserklärung
EU-declaration of conformity

Hiermit erklärt Bühler Technologies GmbH, dass die nachfolgenden Produkte „Geräte" im Sinne der Richtlinie

Herewith declares Bühler Technologies GmbH that the following products are "equipment" according to Directive

2014/34/EU
(ATEX)

In ihrer aktuellen Fassung sind.

in its actual version.

Folgende Richtlinien wurden berücksichtigt:

The following directives were regarded:

2014/35/EU (NSR/LVD)
2014/30/EU (EMV/EMC)

Produkt / products: Messgaspumpe / Sample gas pump
Typ / type: P1.3

Die Produkte werden entsprechend der derzeitig gültigen Atex-Richtlinie innerhalb der internen Fertigungskontrolle folgendermaßen gekennzeichnet:
The products are marked according to the currently valid Atex directive during internal control of production:

II 3/3 G Ex h IIC T3/T4 Gc X — Kennzeichnung unter Berücksichtigung des nicht-elektrischen Explosionsschutzes
Marking, taking into account non-electrical explosion protection

II 3 G Ex nA nC IIC T4...T3 Gc — Kennzeichnung unter Berücksichtigung des elektrischen Explosionsschutzes
Marking, taking into account electrical explosion protection

Zur Beurteilung der Konformität gemäß Atex-Richtlinie wurden folgende harmonisierte Normen herangezogen:
For the assessment of conformity according to the Atex directive the following standards have been used:

EN 60079-0:2012 + A11:2013 **EN 60079-15:2010** **EN ISO 80079-36:2016**

Der Hersteller hat die Übereinstimmung des Gerätes mit aktuelleren Normenausgaben als in der Baumusterprüfbescheinigung aufgeführt geprüft und die Konformität festgestellt:
The manufacturer has checked the compliance of the device with more current standards than those listed in the type examination certificate and has established conformity:

EN IEC 60079-0:2018

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.
This declaration of conformity is issued under the sole responsibility of the manufacturer.

Dokumentationsverantwortlicher für diese Konformitätserklärung ist Herr Stefan Eschweiler mit Anschrift am Firmensitz.
The person authorised to compile the technical file is Mr. Stefan Eschweiler located at the company's address.

Ratingen, den 25.02.2021

Stefan Eschweiler
Geschäftsführer – *Managing Director*

Frank Pospiech
Geschäftsführer – *Managing Director*

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen,
Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

RMA-Formular und Erklärung über Dekontaminierung
RMA-Form and explanation for decontamination

RMA-Nr./ RMA-No.

Die RMA-Nr. bekommen Sie von Ihrem Ansprechpartner im Vertrieb oder Service. Bei Rücksendung eines Altgeräts zur Entsorgung tragen Sie bitte in das Feld der RMA-Nr. "WEEE" ein./ You may obtain the RMA number from your sales or service representative. When returning an old appliance for disposal, please enter "WEEE" in the RMA number box.

Zu diesem Rücksendeschein gehört eine Dekontaminierungserklärung. Die gesetzlichen Vorschriften schreiben vor, dass Sie uns diese Dekontaminierungserklärung ausgefüllt und unterschrieben zurücksenden müssen. Bitte füllen Sie auch diese im Sinne der Gesundheit unserer Mitarbeiter vollständig aus./ This return form includes a decontamination statement. The law requires you to submit this completed and signed decontamination statement to us. Please complete the entire form, also in the interest of our employee health.

Firma/ Company

Firma/ Company	
Straße/ Street	
PLZ, Ort/ Zip, City	
Land/ Country	

Ansprechpartner/ Person in charge

Name/ Name	
Abt./ Dept.	
Tel./ Phone	
E-Mail	

Gerät/ Device	
Anzahl/ Quantity	
Auftragsnr./ Order No.	

Serien-Nr./ Serial No.	
Artikel-Nr./ Item No.	

Grund der Rücksendung/ Reason for return

- ☐ Kalibrierung/ Calibration
- ☐ Modifikation/ Modification
- ☐ Reklamation/ Claim
- ☐ Reparatur/ Repair
- ☐ Elektroaltgerät/ Waste Electrical & Electronic Equipment (WEEE)
- ☐ andere/ other

bitte spezifizieren/ please specify

Ist das Gerät möglicherweise kontaminiert?/ Could the equipment be contaminated?

☐ Nein, da das Gerät nicht mit gesundheitsgefährdenden Stoffen betrieben wurde./ No, because the device was not operated with hazardous substances.

☐ Nein, da das Gerät ordnungsgemäß gereinigt und dekontaminiert wurde./ No, because the device has been properly cleaned and decontaminated.

☐ Ja, kontaminiert mit:/ Yes, contaminated with:

☐ explosiv/ explosive	☐ entzündlich/ flammable	☐ brandfördernd/ oxidizing	☐ komprimierte Gase/ compressed gases	☐ ätzend/ caustic	☐ giftig, Lebensgefahr/ poisonous, risk of death	☐ gesundheitsgefährdend/ harmful to health	☐ gesundheitsschädlich/ health hazard	☐ umweltgefährdend/ environmental hazard

Bitte Sicherheitsdatenblatt beilegen!/ Please enclose safety data sheet!

Das Gerät wurde gespült mit:/ The equipment was purged with:

Diese Erklärung wurde korrekt und vollständig ausgefüllt und von einer dazu befugten Person unterschrieben. Der Versand der (dekontaminierten) Geräte und Komponenten erfolgt gemäß den gesetzlichen Bestimmungen.

This declaration has been filled out correctly and completely, and signed by an authorized person. The dispatch of the (decontaminated) devices and components takes place according to the legal regulations.

Falls die Ware nicht gereinigt, also kontaminiert bei uns eintrifft, muss die Firma Bühler sich vorbehalten, diese durch einen externen Dienstleister reinigen zu lassen und Ihnen dies in Rechnung zu stellen.

Should the goods not arrive clean, but contaminated, Bühler reserves the right, to comission an external service provider to clean the goods and invoice it to your account.

Firmenstempel/ Company Sign

Datum/ Date

rechtsverbindliche Unterschrift/ Legally binding signature

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
E-Mail: service@buehler-technologies.com
Internet: www.buehler-technologies.com

Vermeiden von Veränderung und Beschädigung der einzusendenden Baugruppe

Die Analyse defekter Baugruppen ist ein wesentlicher Bestandteil der Qualitätssicherung der Firma Bühler Technologies GmbH. Um eine aussagekräftige Analyse zu gewährleisten muss die Ware möglichst unverändert untersucht werden. Es dürfen keine Veränderungen oder weitere Beschädigungen auftreten, die Ursachen verdecken oder eine Analyse unmöglich machen.

Umgang mit elektrostatisch sensiblen Baugruppen

Bei elektronischen Baugruppen kann es sich um elektrostatisch sensible Baugruppen handeln. Es ist darauf zu achten, diese Baugruppen ESD-gerecht zu behandeln. Nach Möglichkeit sollten die Baugruppen an einem ESD-gerechten Arbeitsplatz getauscht werden. Ist dies nicht möglich sollten ESD-gerechte Maßnahmen beim Austausch getroffen werden. Der Transport darf nur in ESD-gerechten Behältnissen durchgeführt werden. Die Verpackung der Baugruppen muss ESD-konform sein. Verwenden Sie nach Möglichkeit die Verpackung des Ersatzteils oder wählen Sie selber eine ESD-gerechte Verpackung.

Einbau von Ersatzteilen

Beachten Sie beim Einbau des Ersatzteils die gleichen Vorgaben wie oben beschrieben. Achten Sie auf die ordnungsgemäße Montage des Bauteils und aller Komponenten. Versetzen Sie vor der Inbetriebnahme die Verkabelung wieder in den ursprünglichen Zustand. Fragen Sie im Zweifel beim Hersteller nach weiteren Informationen.

Einsenden von Elektroaltgeräten zur Entsorgung

Wollen Sie ein von Bühler Technologies GmbH stammendes Elektroprodukt zur fachgerechten Entsorgung einsenden, dann tragen Sie bitte in das Feld der RMA-Nr. „WEEE“ ein. Legen Sie dem Altgerät die vollständig ausgefüllte Dekontaminierungserklärung für den Transport von außen sichtbar bei. Weitere Informationen zur Entsorgung von Elektroaltgeräten finden Sie auf der Webseite unseres Unternehmens.

Avoiding alterations and damage to the components to be returned

Analysing defective assemblies is an essential part of quality assurance at Bühler Technologies GmbH. To ensure conclusive analysis the goods must be inspected unaltered, if possible. Modifications or other damages which may hide the cause or render it impossible to analyse are prohibited.

Handling electrostatically conductive components

Electronic assemblies may be sensitive to static electricity. Be sure to handle these assemblies in an ESD-safe manner. Where possible, the assembles should be replaced in an ESD-safe location. If unable to do so, take ESD-safe precautions when replacing these. Must be transported in ESD-safe containers. The packaging of the assemblies must be ESD-safe. If possible, use the packaging of the spare part or use ESD-safe packaging.

Fitting of spare parts

Observe the above specifications when installing the spare part. Ensure the part and all components are properly installed. Return the cables to the original state before putting into service. When in doubt, contact the manufacturer for additional information.

Returning old electrical appliances for disposal

If you wish to return an electrical product from Bühler Technologies GmbH for proper disposal, please enter "WEEE" in the RMA number box. Please attach the fully completed decontamination declaration form for transport to the old appliance so that it is visible from the outside. You can find more information on the disposal of old electrical appliances on our company’s website.

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
E-Mail: service@buehler-technologies.com
Internet: www.buehler-technologies.com